The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Plant Construction and Design

SINCE the first number of THE CHEMICAL AGE was published, some three years ago, we have repeatedly insisted on the necessity for the chemist—more especially the industrial chemist—to reconnoitre beyond his own particular borders and acquaint himself with the methods of his indispensable neighbour, the engineer. By opening our columns on some occasions to purely engineering writers we feel that we have assisted in strengthening that *ésprit de corps* which has begun to spring up between these two distinct yet collateral branches of science; and now that a good start has been made it is well to strengthen this newly-formed association by confronting at intervals the more chemically minded with the opinions of, and the progress made by, the mechanical and structural workers. With two official bodies—the Chemical Engineering Group and the Institution of Chemical Engineers—to cater for the requirements of those associated with the construction and operation of plant, the science of chemical engineering should rapidly progress on orderly and positive lines. Standards should be evolved and sound precedents created which might be regarded as exemplifying the best practice, so that some semblance of uniformity of construction may gradually take the place of the adventitious practices employed in the past. It cannot be denied that some of our older chemical works are conspicuous for the fantastic examples of engineering which they exhibit, and, although it may take a generation to eliminate all the structural anomalies which exist to-day, it is at least a source of gratification to know that their number is not being added to.

In one direction in particular the science of chemical engineering is proceeding at a remarkable rate. We refer not so much to methods of construction as to the materials employed in construction. This is a phase of the subject with which the chemist is more concerned than is the engineer. Accordingly, the chemist, knowing the conditions with which he has to contend, can turn his own particular knowledge to account in his endeavour to attain perfection. In this issue will be found a number of articles dealing with a variety of chemical engineering problems, but the works manager who is responsible for the upkeep and renewal of plant, will find particular interest in what Mr. W. H. Coleman has to say about some of the newer materials which are available to-day for plant construction. It should primarily be understood that as yet there is no single material which has a universal resistivity, which means that each problem must be accorded individual study. The demands of to-day are far more exacting than those of a decade ago, the rate of production has increased, the standard of quality looked for is much higher, and the machine is displacing the manual worker. The manufacturer, however, is rising well to the situation; he appreciates that the works manager is not now amenable to bluff and deception, with the result that there is every evidence of closer co-operation between seller and buyer, which can be nothing else than helpful to the interests of both.

Popular Chemical Exposition

Two valued contributors—Mr. T. Macara, the director of a British research association, and Dr. Stephen Miall, whose quiet and helpful influence is perceptible in so many chemical movements—recently suggested that we should offer some suggestions as to how the public might be induced to take a greater interest in modern scientific developments. We appreciate the compliment, but shrink from anything approaching oracular advice. It may, however, be permissible, as

a very modest beginning, to set down a few general observations on the position.

The need of a more effective exposition of science to the general public is admitted. Whether it can completely be supplied by any system or organisation is doubtful, though, of course, that might help. The best exposition that science has had in the past has often been incidental rather than calculated. It has come through great personalities who have had a natural gift of interpretation, or have discovered something that appealed to the public imagination, or in expressing themselves have unconsciously expressed their science. The case of Darwin may, perhaps, serve as an illustration. A lifetime of the most patient observation and research brought out of the immense mass of detail certain conclusions as to biological processes, and upon these was gradually based a theory of evolution. This theory, when its implications became understood, was recognised as challenging current religious beliefs very near their foundations. The Church took it up and discussed it furiously. Before very long there was hardly a pulpit or a review or a church or chapel debating society in the country which was not actively engaged in the controversy. Science and revelation in their bearings on religious faith for a time filled the popular imagination. Quite unintentionally, through the person of a scientific recluse, science thus got a tremendous popular advertisement. Another example of a rather different sort may be found in Huxley. A brilliant tractarian, his slashing assaults on the conventions of his time instantly arrested attention. Here, again, religious interests were engaged, and divinity students, whatever their age, could no more neglect Huxley's articles than they could the *Analogy*. Science, once more, in its bearing on current thought and ideals, was in everybody's mind. There is no living scientist to-day who challenges the attention of his generation to any comparable extent ; none who has set in motion such a conflict of ideas. It is not that science is less important or less interesting ; it merely lacks the popular excitement that a great personality or a set of special circumstances may sometimes supply. In this case there is nobody to blame ; the verdict must be one of natural causes.

In other directions scientists, and especially chemists, may themselves be partly responsible for the present public indifference. Two examples may be briefly noted. The first is an affected contempt for the lay public and the lay press. This is a miserable pose. Intended to proclaim the *poseur's* intellectual superiority, it merely demonstrates his incapacity to understand life in its broader aspects. We are not thinking now of such warnings as that of Professor Armstrong in his Messel Lecture to beware of the journalist and the propagandist. For the professor himself, with his wonderful command of the means of expression and his subtle insight into what is happening around him, could no more help being a journalist of the higher order than Matthew Arnold could avoid turning his departmental reports into something very like literature. We are thinking of a very different type—the man who, affecting a disdain for non-technical opinion, could not write an article on his own subject, even to save his life, which any moderately good daily would look at. Yet the need is urgent and the work is difficult. Easy reading, as Dr. Miall puts it, is hard writing. In Parliament and other places chemical interests often come up for attention, and they suffer because so little is known of them. Similarly, in the United States a leading banker has just been appealing to the chemical industry to make itself better understood—to bankers, to Congressmen, and to the public generally. Chemistry badly wants its interpreters in journals which the public read.

The second handicap from which chemistry suffers is the deliberate policy of some societies of confining knowledge to their own official organs which, even if read by their own members, are not read outside. The principle they proceed on is that of a friendly or an insurance society which limits its benefits to its own subscribers. The very success with which a learned society thus insulates its benefits from all except its own adherents is the measure of its failure to fulfil its larger objects. Contrast with this the policy of the British Association, which freely circulates in advance its papers and addresses and invites the co-operation of the press in diffusing knowledge as widely as possible. This year it even talks of broadcasting its news. Can anyone doubt which of these policies is the right one for the custodians of public knowledge to follow, and which, in the long run, is the better for the society itself ?

We fear that what has been said does not tell Mr. Macara and Dr. Miall what they want to know—how to excite a greater public interest in science. It bears, however, indirectly on the subject, in placing on those who are the trustees of scientific knowledge the primary duty of public education. When all our societies have recognised the existence of a public outside themselves and the obligation of trying to keep it properly informed, instead of striving to prevent it from knowing what is going on, we may turn to possible ways of discharging the obligation.

Dr. Hugh S. Taylor on Catalysis

DR. HUGH S. TAYLOR, who is well-known to our readers from the fact that he has frequently contributed articles to our columns, had the distinction recently of presenting his views on catalysis before the members of the Franklin Institute. Of the field of catalysis, and in particular the application of catalytic agents to modern industrial processes, Dr. Taylor has for long made a special study, and his research work in this country during the war will not be readily forgotten. When, therefore, he sees fit to discourse on his own pet subject we can usually be sure that his work at Princeton University has resulted in the disentanglement of some problem or other. Although, in the main, Dr. Taylor's recent address formed a masterly survey of the mechanism of catalytic agents in chemical processes, here and there are to be found suggestions and allusions to later conceptions which should make his remarks well worth the close study of technologists over here. There seems to be a general impression that the investigation of a catalytic process is a somewhat random business, and that the discovery of a catalytic agent is a fortuitous result of trial and error with

indiscriminate selections from available compounds. It is true that a large number of catalysts have been discovered accidentally and with little basic theory guiding the choice of material to be studied; but, as Dr. Taylor points out, with the accumulation and systematisation of facts re ative to catalytic agents and the reactions they promote, the study of new processes has become less and less empirical. Accordingly, the co-ordination of knowledge relating to these agents and the reactions they assist has given to the catalytic chemist of to-day far more deliberate and purposeful methods of work.

Our readers may recall that about a year ago a considerable amount of interest was displayed in the daily and technical press in connection with certain claims that a process had been devised for producing methyl alcohol from water gas. At that time some opinions were offered in these columns as to the mechanism of the process, and we note that Dr. Taylor has now something to say about the matter. The process is one having immense industrial potentialities, and Dr. Taylor suggests that the reaction may be formulated by means of the equation :—

$$CO_2 + 2\,H_2 = CH_3OH.$$

The process probably takes place through formaldehyde as an intermediate product, which is then immediately hydrogenated to methyl alcohol :—

$$CO + H_2 = HCHO.$$
$$HCHO + H_2 = CH_3OH.$$

The essential reactions are hydrogenations, and, therefore, in all probability they call for reduced metals as catalysts, so that the knowledge that copper is an active agent for the dehydration of methyl alcohol to yield formaldehyde is evidence in favour of a trial of reduced copper as a catalyst.

To many there can be no doubt that the most interesting phase of the general subject of catalysis is that of preferential catalysis. It seems to be quite possible by the choice of a suitable catalytic agent to secure the preferential progress of a given gas reaction in the presence of other gases which are also capable of undergoing the same reaction. The most outstanding example is, of course, the reaction involved in the removal of sulphuretted hydrogen from gases by means of oxide of iron. As at present operated, this process is necessarily one of delayed catalysis; but there is little doubt that before long some means will be found for measurably reducing the space velocity, thus effecting an enormous reduction in the size of the present cumbersome plant. We must confess to a little disappointment that Dr. Taylor has avoided reference to this matter; but, from personal association and work with him, we know that the problem has engaged his earnest attention, and possibly we may not have to wait long before he satisfies our curiosity.

New Chemical Publications

NEXT week in THE CHEMICAL AGE we shall begin the publication of a series of articles by Mr. A. R. Tankard, F.I.C., public analyst and bacteriologist to the city of Hull, on "Chemistry in the service of the Community." These articles cover a wide field and will serve the useful purpose of making the public debt to chemistry better understood. Probably they may appear in booklet form later. Another reprint of articles which first appeared in THE CHEMICAL AGE will be published early next month, namely, Dr. Philip Schidrowitzs' learned and condensed review of "Recent progress in rubber chemistry and technology." The first five volumes of the Chemical Engineering Library, also published by the proprietors of this journal, are now out of the press, and will be on sale about the middle of September. Authorities who have seen them speak highly of the series, and already advance orders are coming in freely from students of chemical engineering in this country and the United States. As already announced, a number of important text-books on aspects of industrial chemistry will follow in due course. It is hoped in this way to give chemical students the results of the latest research and practice in various fields, and especially to make known the work of the younger school of research men and technologists.

Points from Our News Pages

The following special articles are published :—"New materials for use in the construction of chemical plant," by W. H. Coleman, F.I.C. (p. 264); "Relative merits of nitre pot and ammonia converter," by "Questor" (p. 266); "American wooden tank and vat practice," by D. M. Newitt, B.Sc. (Lond.) (p. 270); and "Chamber plant for the simultaneous production of oleum and chamber acid" (p. 274).

Dr. Ellwood Hendrick, who is now on his way back to New York, gives some impressions gained during his two-months' visit to this country (p. 268).

Reviews are published of the third edition of G. F. Zimmer's work on "Mechanical handling of materials," and H. N. Holmes's "Manual of colloid chemistry" (p. 269).

A description is published of T. Cooke & Sons' method of pneumatic transmission for works, offices, etc. (p. 276).

Notices are given of a number of trade publications, catalogues, etc. (p. 277).

In our London report the chemical market this week is described as fairly bright, prices in the main firm, and export trade much brighter (p. 285).

With the passing of the holiday season, states our Scottish Market Report, inquiries are more plentiful and business is expected to be brisker (p. 287).

Book Received

ABRIDGED SCIENTIFIC PUBLICATIONS FROM THE RESEARCH LABORATORY OF THE EASTMAN KODAK CO. Vol. IV. New York: Eastman Kodak Co. Pp. 319.

The Calendar

Sept. 4	Institution of Rubber Industry: "Rubber Latex in Paper Making." Frederick Kaye. 7.30 p.m.	Engineers' Club, Coventry Street, London.
4-9	American Chemical Society: Annual Meeting.	Carnegie Institute of Technology, Pittsburg, U.S.A.
6-13	British Association for the Advancement of Science: Annual Meeting.	City Hall, Hull.
19-22	Institute of Metals: Autumn Meeting.	Swansea.
Oct. 9-15	International Congress on Liquid Fuels.	Paris.

New Materials for the Construction of Chemical Plant

By W. H. Coleman, F.I.C.

In this article the author, an acknowledged authority on the subject, discusses the qualities essential in materials used in the construction of chemical plant and the characteristics of some of the newer materials now available to the chemical engineer.

A NOTED Scotch ironfounder who was given to writing verses is reported to have published one of his collections under the title of *Rough Castings*, with the result that the publication went to a second edition. I trust that those who cast their eyes on the heading of these few remarks will not be annoyed, if they are brave enough to read further, to find that I have really very little to tell them of new material. As a class, chemical manufacturers in this country cannot be described generally as "seekers after every new thing," with the result that we are often found to be a long way behind our competitors.

Desirable Qualities in Materials

What are the desirable qualities in the material of which chemical plant is to be constructed? The answer may be given in various ways—low first cost, durability, ease of replacement, ease of working, etc.—but what should be the real consideration? To answer this question one has to ask another. To what end are industrial chemical operations performed? This sounds stilted, but it is not easy to put it into simpler words, and it must stand.

I will try to answer the question, emphasising that the word industrial has been used. The prime reason for carrying on industrial chemical operations, as indeed all industrial operations, is to obtain a material return for the capital risked, and by capital must be understood everything which can be regarded as being capable of producing those things which are desired by the community or which the community can be induced to desire. Capital, therefore, properly includes knowledge, ability, and gold, all those things which can be acquired and in part saved or stored up for future use. Gold, the universal medium by which the value of all other stored things is computed, or the control of gold, has therefore come to be the chief thing that is in our minds when we speak or think of capital.

Now chemical plant is the contrivance by means of which certain desirable changes in the state of matter are produced, and it is therefore highly desirable that it should be adapted in every way to produce the maximum of result with the minimum of expenditure of capital. The ideal material for use in the construction of apparatus or plant in which chemical operations are to be carried out would have the same composition as the materials being treated, provided it had also the necessary mechanical and physical properties. This desirable end has so far only been obtained in certain electric furnace operations where the containers are practically lined with the unacted-on portion of the charge; this is possible owing to the way in which the heat is introduced by means of electrodes passing into the mass. In nearly all other operations a great deal of consideration must be given not only to the method of introducing the heat but to many other points, such as strength to stand shock, resistance to chemical attack from the materials being treated, and so on.

For many years, in the early days of large scale chemical industry, the chief materials used in the construction of plant were iron, copper, lead, stone, brick, and wood, and for a long time these served their purpose. Of late years, however, the demand of the industry has been more severe, the rate of production has increased, the standard of quality looked for in the products has been much higher, and mechanical contrivances are rapidly displacing manual operatives, so that demands made on the materials of construction are now much greater.

To take one aspect of the case—the resistance offered by the material being treated or resulting from such treatment—the state of the surface of the material employed in the construction of the plant is of the utmost importance. Speaking generally, the attack by the substances being treated on the material of the containing vessel begins slowly at first, and continues with ever-increasing speed. There are, of course, exceptions, such as the action of nitric acid or of bleaching liquor on iron; in both cases, after a first violent attack, the action seems to stop altogether. In general, however, it is otherwise, and we must try to find the reason before we can seek a remedy and select or prepare a suitable material. It has been noticed again and again that material such as sheet lead which has the surface skin resulting from the rolling operation unbroken resists attacks in a most remarkable way when compared with lead that has had this surface skin removed or abraded. It is much the same with sheets of other metals and with concrete surfaces, and is probably due not only to the actual crowding together of the molecules in the surface layers, but also to the further probability that, as a result of this crowding, or as a necessary preliminary, the molecules were forced to arrange themselves in some orderly manner and so present a firm front to the foe, leaving no loophole for attack. Certain alloys and compound metals seem to lend themselves to the formation of this highly resisting surface layer, and research in the direction of the production and properties of such mixtures as Monel metal, tantiron, ironac, rustless steel, hard lead, and bronzes of various types will afford the chemical engineer materials possessing a great variety of properties from which to choose.

A Word of Warning

A word of warning may be given here. It has frequently happened that when a new material has been found to be resistant to one chemical substance or class of substances, claims have been made for an almost universal resistivity probably quite unattainable. The chemical engineer must accept with caution all such claims, and study each problem and each part of the problem by itself, as well as the inter-relation of the various parts, and the probability that all chemical action is more or less electrolytic in its nature must be kept in view and conditions avoided which might lead to local differences of potential.

Among non-metallic materials it is interesting to note that many of the igneous rocks—for example, the volvic lava of Auvergne—have proved highly resistant to chemical attack, and it would appear that a careful study of their formation, especially the conditions under which they cooled, would lead to a knowledge of the best way of producing similarly resistant materials artificially. Something has already been done on these lines, and some of the ceramic bodies, such as ceratherm, vitreon, etc., are already largely employed in chemical works.

Another new type of material which seems to offer considerable possibilities is the product of the condensation of phenols and formaldehyde. This material in various forms and under many names, as Bakelite, formite, synthite, etc., has many properties that should render it serviceable to the chemical engineer. It is almost unburnable, is unattacked by most chemicals, and can be rendered very hard and tough. If the difficulties of manipulation can be overcome, there are many directions in which it might replace metals, ebonite, and hard rubber with advantage.

Fused silica or vitreosil is one of the newer materials which has received a very wide application and, although its inability to withstand the attack of strong alkaline

substances is a great drawback, it has helped to solve many problems, especially those regarding the concentration and recovery of acids, and if one could obtain a similar material of a basic nature there should be a good demand for it.

Care in Dealing with New Materials

As an instance of the care necessary in dealing with new materials a little of personal experience may be given. Some years ago "manganesite" was adopted in a certain chemical works as a jointing material for steam and other pipe mains. It was found to be excellent, so much so that the foreman fitter could scarcely be persuaded to use anything else. Some time afterwards quinoline was being recovered from coal tar oil on a small manufacturing scale, and as it was necessary to keep the distilled product as colourless as possible, the joints of the condenser coil were ordered to be faced and only very thin asbestos sheet coated with a paste of sodium silicate and asbestos powder used in the joints. Later on, a leak occurring, one or two of the joints had to be re-made, and the zealous fitter used his beloved manganesite without saying anything to anybody. For a short time all went well; then the quinoline distillate began to turn green, much to the annoyance of the chemist in charge. Redistillation in the same apparatus gave no improvement, but a small sample redistilled in the laboratory gave a colourless distillate and so fastened the guilt on the plant. After some time the use of the manganesite was discovered, the colouration having been found to be due to a green manganese compound; the manganesite was replaced and all went well. This short account has been given to emphasise the care which it is necessary to exercise when taking any new material into use.

Now here lies the work of the chemical engineer, and I may perhaps be forgiven if I add one more attempt to the many that have been made before to define the term, or rather, to describe the man. A chemical engineer is a person whose function it is to adapt existing contrivances to the production of new bodies, or to the treatment of new materials by old ways, or old materials by new ways; or, failing suitable existing contrivances, to devise new ones. He should have a good chemical training, he must have chemical works' experience, and he will be all the better the more mechanical and machine shop practice he has had. Having decided on the best way of carrying out the desired operation on the large scale, the necessary dimensions and functions of the plant, and the material of which the different parts must be made, he can, with advantage, leave the mechanical details to the mechanical engineer so long as he knows enough about it himself to watch the other closely, and to see that he does not vary from the instructions given him in order to conform with some tenet of his engineering faith which is and was and ever ought to be.

The Vital Question of Cost

At the beginning of these very discursive remarks I said something about getting a good return on capital, and as I do not seem to have shown the connection between that remark and new constructional material I will endeavour to do so now, for it is important and often lost sight of. The object, commercially speaking, of carrying out a chemical process on the manufacturing scale is, to put it crudely, to make money on the transaction, and the answer to the question as to whether a new material shall be adopted for the construction of a piece of plant, is to decide the further question, will the advantages to be gained pay for the extra costs, both first costs and running costs, or will the decrease in cost compensate for any falling off in the yield or quality of the product? These questions require very careful consideration, and cannot be left to the decision of the maker of the new constructional material, for however honest he may be, he cannot possibly possess the necessary knowledge, unless he himself is an experienced chemical engineer, a somewhat exceptional combination.

It is, therefore, well worth the consideration of chemical manufacturers and of chemists also, that when it comes to a question of new material for the construction of plant the services of a competent chemical engineer are needed and should be employed. The cost of doing so will be more than repaid by the avoidance of many pitfalls, some of which have been alluded to, because the chemical engineer, if he be worth the name, has the mentality and experience necessary to consider the question before him from all points of view. A mechanical engineer cannot get away from the traditions of his craft, nor the chemist from his equations, but the chemical engineer can and must.

Anti-Corrosive Preparations

To the Editor of THE CHEMICAL AGE.

SIR,—I am writing you in regard to an article by "Latex" published in THE CHEMICAL AGE in April, 1921, regarding anti-corrosive preparations for iron and steel. I would like to know if you could refer me to parties interested in coatings that are, and have been proved to be, damp proof and water proof, serve as an electrical insulator for all iron and steel, and can be made in a film or a heavy coating. These goods (which I have) have recently been patented in the United States and also in Great Britain and other countries.

In paragraph 18 of the article reference is made to "Toch Bros." or "Maxmillian Toch," of New York. It is stated that asphaltic paint is so quickly oxidised as to be reduced to an inert mass within the short space of twenty days. I am prepared with direct evidence of my goods lasting even longer than twenty years, and having stood the test by the State authorities as to fire-retarding for two hours and five minutes without being able to get a flame on even ordinary wrapping paper. I would like to get in touch with some of the paint men in Great Britain who realise the possibility of such goods. —Yours, etc.,

CHESTER S. HATHAWAY.

7, Rand Building,
Taunton, Mass., U.S.A.
August 2.

Corrosion in Chemical Works

To the Editor of THE CHEMICAL AGE.

SIR,—A recent inquiry from one of your subscribers in Lancashire prompts these few notes. A cylindrical tank subjected to temperatures ranging from 54° Fahr. to 280° Fahr., with an internal flange at one end and an external flange at the other, was found to be very seriously corroded and had eventually to be renewed. Those who have such tanks under their control must remember that any part of such a structure subjected to stress will corrode more rapidly at that part than at any other, if conditions are equal. In flanged work of iron or steel plate, the corrosion is more marked when the stress is caused by tension. In the case of pipes which are screwed, corrosion is most severe on that part of the thread which is flattened, as it disappears on the body of the tube. All such joints should have the threaded part properly covered.—Yours, etc.,

August 18. "CHINA CLAY."

Annual Meeting of the American Chemical Society

FROM an industrial standpoint the meeting of the American Chemical Society to be held in Pittsburg from September 4 to 8 will be one of the most important scientific gatherings ever held in the U.S.A. Among the important inventions which will be publicly described for the first time is a new zinc oxide, much smaller in particle size than any zinc oxide previously made, the work of Frank G. Breyer, chief of research for a New Jersey zinc concern. It is claimed that this pigment, used in the tread of tyres, gives almost twice the wear of tyres containing ordinary zinc oxide.

Dr. Thomas Midgley, Jr., and T. A. Boyd, of Dayton, Ohio, will give a demonstration in Carnegie Hall of how various fuels detonate, and explain how "knocking" in internal combustion engines may be reduced by the use of various compounds.

Relative Merits of Nitre Pot and Ammonia Converter

By "Questor"

In this article our contributor, "Questor," gives his final reply to the views expressed in previous contributions by Mr. Charles Cooper, M.Sc., and "Ecco."

THAT there were other points of view affecting the merits, utility and economics of the ammonia oxidation process as applied to sulphuric acid manufacture, in addition to those originally submitted by Mr. Cooper, has been made abundantly clear, and the writer's purpose has thus been served.

Obviously, the angle from which one interested in the sale of chemical plant approaches a technical subject must be different from that of the user of the plant. In controversies of this character it is well to remember the words of Emerson, who said: "Yet if a man fasten his attention on a single aspect of truth, and apply himself to that alone for a long time, the truth become distorted, and not itself, but falsehood." With due regard to this dictum, the writer will attempt to traverse finally the outstanding points raised in connection with the several aspects in question.

Relative Costs: Materials

The costs of materials, and selling price of the residual product, nitre cake, must vary according to the geographical position of the works, and this factor will determine whether the saving to be effected by the adoption of an ammonia oxidation unit is likely to be 5/4d. per ton of pure nitrate of soda, which represents 0·44d. per ton of monohydrated sulphuric acid (basing on a consumption of 2 per cent. nitrate of soda on sulphur, and a 95 per cent. yield), or £3 11s. 6d. per ton (Mr. Cooper's amended figure), which represents 5·9d. per ton of monohydrated sulphuric acid.

In arriving at the revised figure just named it is noted that no credit is given for nitre cake. It is believed there is a general agreement that in submitting estimates of possible monetary advantages likely to accrue by the adoption of any new or alternative process, average conditions should be the basis.

This leads to the question: How is the nitre cake produced at sulphuric acid works throughout the country disposed of, and what is the average price realised to-day? Fertilizer works consume their own production, either in the manufacture of calcium superphosphate, or in the production of compound manures. Many such works prefer to spray with the aid of compressed air a solution of nitrate of soda into a small front chamber than to pursue the potting-oven process. In any case, the resultant nitre cake is more often than not utilised in one or other of their manufactured products. Hydrochloric acid and alkali works consume not only their own production, but large quantities arising from other acid works. In the heavy woollen districts of Yorkshire, and in some of the districts of Lancashire, nitre cake is used for sud cracking and in the recovery of oil, etc. In South Wales, and some of the Midland districts, nitre cake is used for the removal of scale and oxide from metal plates. Glass works producing the common, or green, quality of glass use tolerably large quantities of nitre cake, and there are many other purposes to which this product is applied.

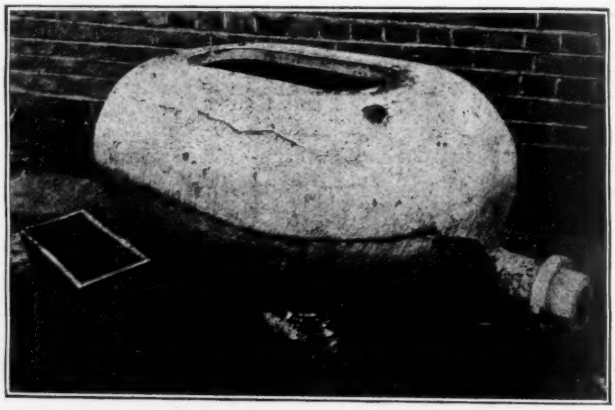
Nitre cake arising from a potting-oven invariably contains a greater sulphuric acid content than that originating from a nitric acid plant. An average figure is about 30 per cent. In this connection the chart and chemical data furnished in the appendix will doubtless be of considerable interest in affording an idea of the consumption of sulphuric acid and the yield of nitre cake under specific conditions.

Whether the figure of 22s. 6d. per ton is "inadmissable for our general purpose" or not, it is certainly equally inadmissable to disregard, as Mr. Cooper does in his revised figure, the market value of nitre cake. It is believed that a fair average figure is 12s. 6d. per ton.

"Ecco" surely oversteps the mark when he suggests that "the only practical basis on which such a comparison may be made is one of actual experience on a particular plant." Surely it is not overall efficiency that is under contemplation, but merely the relative efficiency of the operation of potting in the one case and the ammonia oxidation process *per se* in the other case. A set of identical conditions can never be definitely ensured in the manufacture of sulphuric acid for two given periods, and hence an overall comparison is likely to be vitiated in consequence.

The writer never claimed a 100 per cent. efficiency for the nitre potting process, but he did claim a 96 per cent. efficiency, which can be obtained on all well-designed plants where ordinary care and intelligence are exercised. "Ecco" should test his nitre cake regularly by the nitrometer method, as if it contains undecomposed nitrates, as he apparently suggests, there is something radically wrong. Either the control of his plant is inefficient or the plant is defective, or otherwise the nitre cake is being withdrawn too frequently. There is no difficulty in ensuring nitre cake free of nitrate of soda with an efficient type of potting-oven and the use of suitable pots or trays.

A photograph is given below of a pot suitable for hand manipulation, as also a special tray which has proved eminently efficient in use on those plants where hand potting is not resorted to.



Why does "Ecco" fail to see to the nitre bags being cut open and the adhering nitre brushed off and collected, or else why does not he improvise a nitre-bag washing plant?

Supervision

The writer never suggested that a "properly operated and supervised sulphuric-acid plant could not afford to pay for intelligence in its staff quite up to the standard demanded by the ammonia oxidation plant." This is not the point at issue. Rather are we attempting to decide whether this type of intelligence will not be needed to a greater extent where an ammonia oxidation plant is installed as contrasted with the potting-oven operation. It is clear that Mr. Cooper is convinced that a different type of intelligence is needed to a greater extent; but, anxious as he is to hold a brief for his pet process, he is reluctant to set aside in his financial estimate a reasonable sum to cover the cost of such skilled supervision.

It is feared that "Ecco" outrages his sense of judgment when dealing with this aspect, and it is hoped that a reconsideration of the point of view originally urged by the writer will lead him to a more judicious appreciation of this phase.

Flexibility

It is quite obvious that "Ecco" has something yet to learn in the matter of the maintenance of constant conditions on a sulphuric acid plant, where spent oxide is the raw material. It is suggested that he should give better supervision to his method of storing spent oxide of varying sulphur content. If he relied less on varying his potting charge and more on carrying on adequate stock of nitrous acid (the nitrate of soda equivalent of which his staff were cognizant of), and altered his feed of this essential product judiciously (not

continually—this was never proposed), he will reach the conclusion that the " many disorganisations inevitable on any acid plant " can be reduced to a surprising minimum. The writer has had many years' practical experience of the design and operation of ammonia oxidation plants, as well as potting ovens, but it is submitted that enthusiasm for a more recent and peculiarly fascinating process should not be allowed to distort one's judgment of their relative merits.

The Future

That there will be an increasing demand for nitrogenous fertilizers is agreed. In attempting to presage the future line of development many considerations obviously weigh. As yet India does not consume its own small production of sulphate of ammonia, and yet it is conceded by all who have had occasion to study Indian conditions that its greatest need to-day is an increased food productivity, which alone can result from a more general application of artificial fertilizers. Whether nitrate of soda or sulphate of ammonia will gain the ascendency in this particular part of the Empire is unknown, as the inherent conditions are problematic and peculiar. Other colonies still remain to be developed, and it is not unlikely that considerations of price and practical results from an agricultural point of view will be the determining factors operating in this connection. It will be interesting to examine the position a few years hence in the light of the predictions already made.

General Conclusions

Although the writer does not appreciate the logic of some of the steps and arguments by which " Ecco " arrives at his eventual decision, nevertheless he cordially agrees with the soundness of his general conclusions and the obvious fairness and impartiality with which they are stated. Although it is believed that further cogent reasons have been adduced by the writer for the revision of Mr. Cooper's *amended figure*, it is undoubtedly true to predict that potting ovens and ammonia oxidation plants will continue to exist at sulphuric acid works for much the same reasons that at some factories high-pressure steam boilers are used, whereas at others comparatively low-pressure steam boilers are preferred.

Market prices, local conditions, special circumstances and a certain predilection will doubtless be the potent deciding factors in this matter.

Chemical Data Explanatory of the Above Chart

The above chart was compiled to show at a glance :—

1. The production of nitre cake per ton of sodium nitrate used, and

2. The consumption of 80 per cent. H_2SO_4 in decomposition of sodium nitrate from the acidity of the nitre cake.

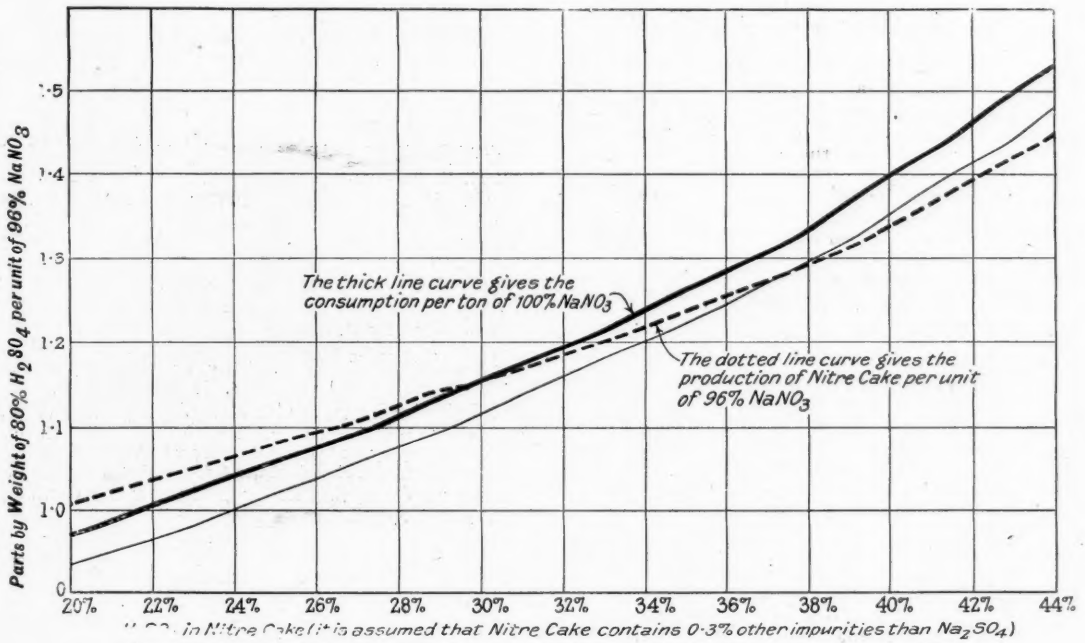
The basic equations representing the decomposition of $NaNO_3$ with H_2SO_4 are :—

$$(a)\quad \underset{170}{2NaNO_3}+\underset{98}{H_2SO_4}=\underset{126}{2HNO_3}+\underset{142}{Na_2SO_4}$$

$$(b)\quad \underset{170}{2NaNO_3}+\underset{196}{2H_2SO_4}=\underset{126}{2HNO_3}+\underset{240}{2NaHSO_4}$$

Obviously, the nearer the reaction process to equation (*a*) the better, as the consumption of sulphuric acid in nitric acid production or the potting-oven process is exactly half that of equation (*b*).

Technical sodium nitrate is constituted of approximately 96 per cent. $NaNO_3$, with 2 per cent. moisture, and a further 2 per cent. consisting of siliceous matter, sodium sulphate and sodium chloride. Traces of other substances are usually present.



Consumption of H_2SO_4 in manufacture of HNO_3 and in the Potting Oven operation

Using the same equations, modified to the use of 96 per cent. $NaNO_3$, and neglecting NaCl and Na_2SO_4 (it would be better to assume their $NaNO_3$ equivalent of final Na_2SO_4 equivalent), we get :—

$$2NaNO_3\times\frac{96}{100}+H_2SO_4\times\frac{96}{100}=2HNO_3\times\frac{96}{100}+Na_2SO_4\times\frac{96}{100}$$

or $$163+94{\cdot}1=121+136$$

From these values there will be theoretically required per unit weight of crude 96 per cent. $NaNO_3$:—

H_2SO_4

$$\frac{94{\cdot}1}{170}=0{\cdot}553 \text{ parts as monohydrate.}$$

$$\frac{553\times100}{80}=0{\cdot}692 \text{ parts 80 per cent. acid,}$$

and the " nitre cake " (consisting in this case of sodium sulphate) yielded will be :—

$$\frac{136}{170}=0{\cdot}802\ Na_2SO_4.$$

Assuming, then, that the nitre cake resulting from any decomposition according to the equations does not contain appreciable quantities of other substances, and that $2NaHSO_4$ consists of molecular proportions of H_2SO_4 and Na_2SO_4, a determination of the acidity of the nitre cake furnishes a ready means of calculating both the acid used for decomposition and the nitre cake produced.

Example.—A titration of nitre cake shows that the acidity calculated to H_2SO_4 is 30 per cent.; by difference then Na_2SO_4 = 70 per cent.; and, as has been shown, the Na_2SO_4 always corresponds to 0·802 parts nitre cake per unit of 96 per cent. $NaNO_3$; therefore, by proportion :—

$$\therefore \quad 70 : \cdot 802 :: 30 : X$$

X = 0·343 parts of the nitre cake produced as H_2SO_4, and 0·802 parts existing as Na_2SO_4 gives a total of 0·343 + 0·802, or 1·145 parts.

Likewise, the acid consumption can be calculated for a similarly constituted nitre cake. For the decomposition of 1 part of sodium nitrate according to equation (*a*) 0·553 parts of sulphuric acid are necessary, and the acidity determination shows 0·343 parts H_2SO_4 as free acid, the total will thus be : 0·553 + 0·343 or 0·896 expressed as monohydrate and 1·12 parts as 80 per cent. acid.

The two cases can be calculated from the following formulæ if the acidity of the nitre cake is known :—

Parts of nitre cake produced per unit of nitrate of soda decomposed (96 per cent. purity) .. $0{\cdot}802 + \frac{0{\cdot}802 \times A}{100 - A}$

Parts of 80 per cent. acid used per unit of nitrate of soda decomposed .. .. $0{\cdot}553 + \frac{0{\cdot}802 \times A \times 100}{(100 - A)\ 80}$

A = Per cent H_2SO_4 in nitre cake.

It is, of course, assumed that the temperature to which the nitre cake is subjected is not above the decomposition-point of $NaHSO_4$ (i.e., $2NaHSO_4 = Na_2S_2O_7 + H_2O$) :

Under such conditions the above formulae cannot be used.

Dr. Ellwood Hendrick

A Parting Message on leaving England

Dr. Ellwood Hendrick, consulting editor of *Chemical and Metallurgical Engineering*, left England for America (as announced last week) on August 19, after a two months' visit. On being asked to give some of his impressions of chemical industry in Great Britain, he said he felt as if asked, on rising from a great feast, to give his impressions of prevalent hunger. British hospitality had, he feared, nearly spoiled him by discouraging that quality of humility which it was his proper business to cultivate as a worker in the field rather than as a captain on horseback. Of British chemists in general he doubted if they were different in nature or even in status from their American cousins. They had the same big problem ahead. Along with its twin sister, physics (to which chemistry is so closely related that the two, if referred to as twins, are surely becoming Siamese), it was the key to man's dominion over nature. Joined in this way to physics, chemistry became deductive rather than experimental, and so the road of progress was remarkably shortened.

" Chemistry," Dr. Hendrick went on, " enters industry and makes it economical; it enters medicine and makes it exact; it enters business and confuses the sharpers; it enters banking and makes for reasonableness. Or it should do these things. In time it must, if we English-speaking peoples are to hold our own. It has already entered into warfare, and yet it would seem that the majority of us, after over two years intense experience with it, are disposed to forget the fact.

" Let's look into this for a few minutes. The air has been conquered—not completely or even adequately, but the art has begun. We are to-day in relation to air transport about where steam railway transportation was in, say, 1845. Greater tonnages, simpler mechanism, and easier facilities are bound to come. The days of the Custom House are numbered.

" We are disposed to think that no nation would be vicious enough to use poison gases in an unprovoked attack on the innocent people of another nation, and so we make conventions against its use, and we declare, just as though we really knew, that we have put a stop to all that sort of thing. We even praise one another for the splendid work that we have accomplished in doing away with such barbarism—by agreement. In the meantime chemistry goes right on, working for the just and the unjust, and every year more and more lethal gases are discovered, and greater and greater capacity to kill and destroy is in process of development.

" We are still in the childhood of humanity. We are hardly out of barbarism; indeed we are not fully out of it. We cultivate only two of our senses and utterly neglect the cultivation and understanding of the sense of smell and touch. With the past century we have made signal advances in the mechanic arts and in natural science, but in other respects we have almost stood still. We have machinery, but we have not yet absorbed machinery into society. We do not know how to use it for human betterment, for human welfare. Religion has lost its hold on vast numbers of us, and one of the principal functions of religion is to establish ideals. What are the ideals of this generation? What are they to-day as compared with ten years ago? Are they really any better? Any higher?

" Now let us imagine a scientifically enlightened and active nation steeped in wrath; obsessed by anger and vengeance. We may know many things we did not know before, but we have not yet advanced in character enough to control the contagion of passion. Now the price of anger is everything else. Under wrath, as we say in America, " the lid is off." Everything goes. Anything goes. Imagine, please, a nation in the throes of such a passion. Never mind about justice or rights. We are dealing with children because we are children.

" The key to success in chemical warfare lies in the surprise attack. It is more sudden, shorter, and more effective than any other means of fighting ever known to man. To succeed every detail must be thought out and vast quantities of some unknown lethal product be made. The capacity to produce, in quantity and secretly, is necessary. Given this, and air development beyond the present stage, and the trick is turned. It is so infernally strategic, so awfully deadly, that there is no resistance. Defeat comes before defence. The indomitable spirit of nations is laid low. There are too many dead.

" That is chemical warfare as it is developing. It is the loaded pistols which we children are playing with, as toys. We agree not to pull the trigger. But suppose one of the children becomes naughty and pulls the trigger! Then we shall have a strategic success of chemical warfare—and slavery again. Note once more, please, that the price of anger is everything else; *everything* else.

" How, then, are we to meet this new thing, this loaded pistol quality of toy with which we children of men are playing? There's a dreadful old saying of the East to the effect that ' only the wise shall enter the Kingdom of Heaven.' Let's substitute for the Kingdom of Heaven the idea of life in peace and good will. To achieve wisdom we must know and understand or have prescience of chemistry. We must know what chemistry can do. We must make of the chemical profession something great and distinguished and desired. It must enter into life as it belongs in life. We must get beyond our didactic " language of chemistry " and recognise a human catalyst as quickly as we recognise precipitated nickel or platinum sponge. We must absorb chemistry as well as sense it and feel it and know it. We must make it a part, a feature, of culture. Then we shall be beyond the pale of surprise. We shall be safe. But along with that, or before it, in the name of all humanity, let us cultivate our souls and try to be good! No nation on earth is good enough to-day to wield the awful power that this new warfare confers on it unless its neighbours also are so advanced in chemistry as to make a surprise attack impossible. To neglect chemistry is to invite conquest."

Industrial Metallurgy Literature

The British Non-Ferrous Metals Research Association has issued a useful list of periodical publications of interest for reference on industrial metallurgy taken by fourteen libraries in London, Birmingham, and Manchester. It is proposed to add other towns and libraries to the list, with the object of making it comprehensive of the current literature dealing with metallurgical subjects.

Mechanical Handling of Materials*

Some Notes on Mr. G. F. Zimmer's Book

In his own particular sphere of engineering Mr. Zimmer stands unchallenged. In the days when engineers were content to employ battalions of truck-pushers he gave us a volume which, apart from its purely technical value, lifted us out of the rut of conventionalism and stimulated our interest in problems which previously had been regarded with apathy. For our own good Mr. Zimmer made us think. To borrow a phrase from the psychologist, our normal field of consciousness began to be interrupted by a "complex" which continually reminded us that we were not taking full advantage of what mechanical engineering had to offer us, and ultimately we learnt to appreciate that we had begun to live in an era in which mechanical ingenuity had triumphed over muscular effort.

Prior to the war we were somewhat slow in recognising the value of machinery, for the reason that we paid our unskilled labourer only some 4s. 6d. per day. This fact is not one which we can take any pride in recalling, but so low a rate of pay merely resulted from the laws of supply and demand. It was, in fact, the market price. Irrespective of any amelioration in the so-called "cost of living" we are never likely to return to such a wage, and consideration of this point is sufficient to illustrate that the scope for substituting machine for man has been immeasurably widened as compared with the position a decade ago. When we view the problem merely from the standpoint of a definite amount of work which we have to accomplish we are, perhaps, a trifle too apt to let the question of relative expenditure take too prominent a place in our analysis of the case, neglecting the fact that the modern machine, apart from effecting a monetary saving, will probably do the work better and will most certainly do it more rapidly. There are many such points which require very careful consideration before a definite policy is decided upon; and it is in helping us to form an accurate judgment that Mr. Zimmer's book is so helpful.

It should be understood that one reads a monumental treatise of this description not for criticism but for instruction. With a specialised volume of the kind one cannot apply the ordinary practice of the reviewer and select isolated sections for particular notice. The author is dealing with each unit of the whole in some cases in infinite detail, and in other cases less comprehensively; but one appreciates that in the necessary process of elimination he shows that balance of discrimination which permits nothing of importance to be overlooked. In his 42 chapters and 1,100 odd pages Mr. Zimmer takes us through every phase of his subject, from the time of Sennacherib to the present day, and by dealing with matters of historical interest and showing the process of evolution operating over a couple of millenniums he adds a touch of romance which is not usually to be found in the bald phraseology of the technical writer. No space, however, is wasted on obsolete installations or devices which may be said to have borne little relation to the handling art, while new ideas which are at the moment under consideration have advisedly not been included where they are still to be regarded as experimental. In the introduction of machinery for mechanical handling, America, no doubt, took the lead. It is satisfactory to note, however, that this lead was quickly followed up in the Eastern hemisphere, and the lack of progressive spirit which was to be found here prior to the war has been displaced by a determination on the part of our own designers and contractors to take a pre-eminent place in a branch of engineering science which is still in a period of adolescence.

Sir John Purser Griffiths has written a forenote to Mr. Zimmer's volume in which he pleads for a revision of the term "labour-saving machinery" that we so glibly apply to mechanical handling. The workman's cry has always been that the substitution of manual labour by mechanical devices has diminished his opportunities for employment—a popular fallacy that has frequently been refuted. For instance, if the speeding-up resulting from the general use of machinery results in considerable economy in the cost of production, then the greater will be the sale of almost all the commodities of life. Again, when production costs are low an opportunity is provided for allocating a bigger margin for wages, or for introducing a shorter working day without a corresponding reduction in wage. Socially, therefore, conditions are improved. Nowhere have the methods of rapid production been carried further than in America, and nowhere are higher wages paid. The writer's experience of the changes wrought by the introduction of machinery is an everyday one. The machine results in the displacement of a considerable amount of unskilled labour, but it is followed by the introduction of skilled labour. For instance, suppose one instals an electrically-driven conveyor. Perhaps a dozen manual workers are displaced, but a couple of skilled electricians will probably have to be introduced to grapple with wear and tear and breakdowns in the new machinery. Ethically, therefore, machinery has an elevating effect. Its introduction must imbue the rising generation with the desire to learn a trade, to abandon muscular in favour of mental effort—and so the workman's sphere of action is gradually transferred to more responsible and less laborious work. Very agreeably, therefore, should we be prepared to alter our present misnomer and to speak in future of "labour-aiding" appliances.

So far as Mr. Zimmer's technical information is concerned the writer has refrained from criticism, for it is unnecessary, undignified even, to enter the lists with the accoutred expert. The volume is a wonderful example of industry and painstaking precision which will for long bear testimony to the author's perception of and practical acquaintance with a subject which he has made his own.

ALWYNE MEADE.

* Third Edition. London: Crosby Lockwood & Son. Pp. 1143. 63s. net.

LABORATORY MANUAL OF COLLOID CHEMISTRY. By H. N. HOLMES. London: Chapman and Hall, Ltd. Pp. 127. 10s.

COLLOID chemistry is rapidly emerging from the stage of a scientific pastime and becoming a valuable aid to industry. Most text books on the subject still show traces of this development by devoting much space to discussions and experiments on what, at present, can only be considered as chemical curiosities. The present volume marks a great advance in this respect. With the aid of 186 carefully described experiments, which are prefaced by conscientious and lucid explanations of their theoretical principles, the author gives an excellent course of laboratory practice in colloids, which should be quite sufficient for the self-instruction of any chemist. The experiments are on a quantitative basis, while quite a number involve the mathematical relationship of colloidal transformations. A small book such as this cannot be expected to form an encyclopædia of the subject, but the writer would do well to give in future editions some methods for measuring the magnitude of colloidal particles. The chapter on ultra-filtration might also be extended. Several sections deal with industries based on colloidal materials and reactions—*e.g.*, indiarubber, dyeing, and tanning, and a reader who has taken up this manual merely to supplement his chemical education may find fruitful ideas for his individual line of work. Numerous references and a bibliography serve to enhance the value of this excellent little book, which one can unhesitatingly recommend.

S. P. S.

American Wooden Tank and Vat Practice

By D. M. Newitt, B.Sc. (Lond.)

This account, by an expert who has made a special study of the subject, of American wooden tank and vat practice will be of interest to chemical engineers whose experience has been confined to metal vessels and may possibly suggest new uses for woods in this country.

SCARCELY any apology is necessary for the publication of the results of some recent investigations on the various woods employed for and the methods of construction of vessels so largely used in every industry. England is a country of iron, and it may be said with some truth that when we think "tanks" we think "iron," our thoughts reverting to other materials only when from chemical or physical reasons the use of iron is inadmissible. In the United States, on the other hand, by reason of the variety, abundance, and cheapness of their timber, iron is seldom used where it can satisfactorily be replaced by wood. Moreover, in a country where towns are widely distributed and local water storage for domestic, factory, and fire preventive purposes is a necessity, the employment of large wooden tanks is so common as to become quite a noticeable feature of the skyline of every town and village.

The use of tanks on such a gigantic scale has given rise to a highly specialised industry engaging the enterprise of many large firms, any one of which could easily meet the entire demand for wooden tanks in England. That use and production on such a scale should be associated with research is only natural; tank engineers who concentrate on the development of the best design for each individual purpose and tank chemists who are constantly engaged upon the study of woods in relation to their chemical and physical properties have amassed a considerable amount of valuable information of which far too little use is made. It is the purpose of these notes to survey briefly the results of some of these investigations and the conclusions that can be drawn from them.

All woods consist of the fundamental wood substance, together with varying proportions of wood gums, resins, tannin, colouring matter, and certain aromatic substances peculiar to definite kinds of woods. The wood substance itself is a ligno-cellulose, the composition of which is approximately the same for all woods, as will be seen from the following table:—

	C.	H.	N.	O.
Oak.....	50·64	6·03	1·28	42·05
Fir.....	50·36	5·92	0·05	43·67
Pine	50·31	6·20	0·04	43·45

Of the other constituents the wood gums are complex bodies, having an empirical formula $C_6H_{10}O_5$ (Tollens). They are insoluble in cold water, but dissolve slowly in boiling water and rapidly in aqueous alkalis. Resins are usually acids or esters of high molecular weight, and often containing a cyclo-hexane ring. Tannin is an organic acid soluble in water and probably formed by the degradation of the ligno-cellulose forming the wood tissues.

Now a material suitable for holding liquids must fulfil some or all of the following conditions:—It must not impart colour, smell, or taste to its contents, and its physical and chemical properties should not be impaired by the action

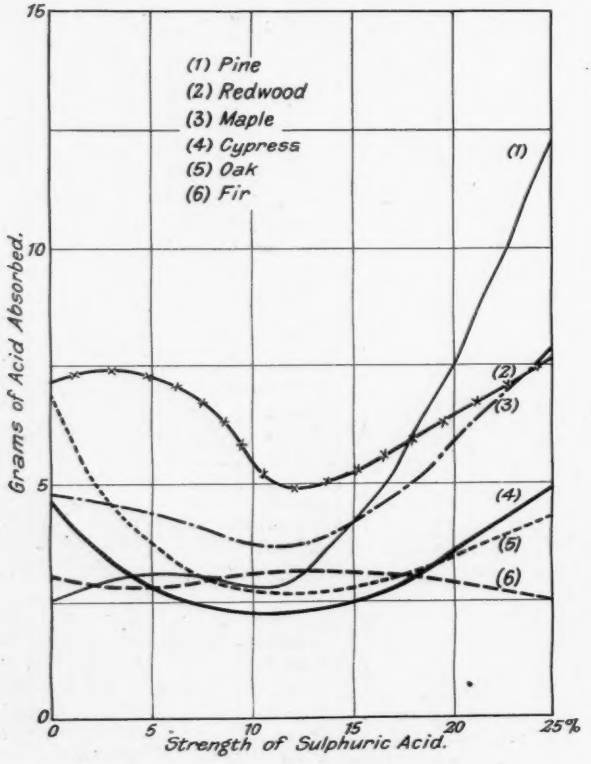


FIG. 1.

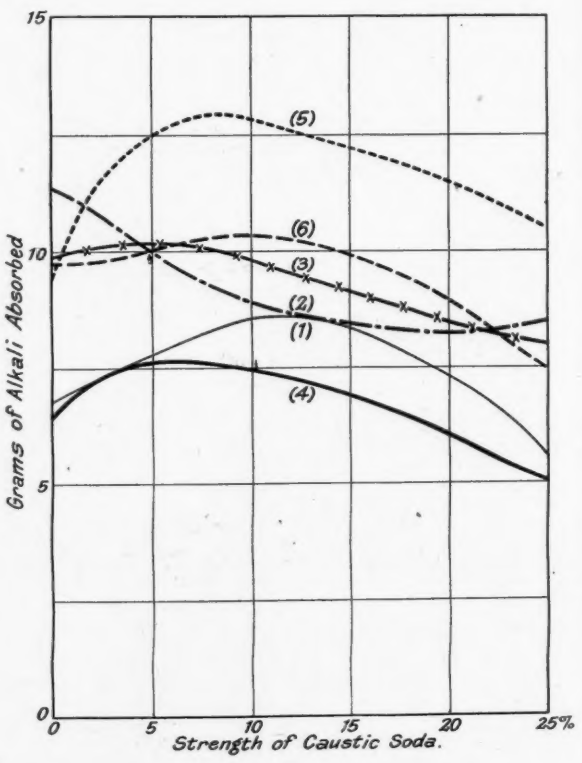


FIG. 2.

of the contents or their vapour coupled with the action of air. The physical properties of the wood will be impaired only if the wood substance itself is attacked. On the other hand, the removal by a solution of the adventitious constituents of the wood will impart both colour and taste to the solvent.

In an extended series of experiments carried out by Hauser and Bahlman, the following six woods were tested: Cypress, douglas fir, yellow pine, redwood, maple, and white oak. The work consisted of (1) a comparison of the colours extracted from the woods by various liquids; (2) a comparison of the absorptive capacity of the woods; (3) changes in volume of the woods resulting from absorption of liquids; (4) changes in the mechanical properties of woods through the action of acids, alkalis and salts. Test-pieces of wood, 4 in. by 1 in. by ¼ in. (1 cub. in.) were employed.

In comparing the colour extracted from the woods, both hot and cold liquids were used, and the experiments lasted over a period of 30 days, during which time the liquids were repeatedly changed. The results may briefly be summarised as follows:—

Water is coloured by all the woods initially, but with the exception of oak and redwood, the colouring matter is soon removed. Oak and redwood continue to impart colour even after eight hours extraction with boiling water.

Caustic alkalis even in 1 per cent. solutions dissolve the gum and resin constituents of the woods, and are consequently deeply coloured. Cypress yields the least colour and oak the most pronounced. Strong caustic solutions attack the wood substance itself and cause fracture of the fibre bundles. Consequently an unlined wooden tank is unsuitable for alkalis.

Acids vary considerably in their effect on the various woods. Hydrochloric acid up to a strength of 50 per cent. does not become coloured by cypress. The 30 per cent. acid is uncoloured by pine, fir, and maple, but even 5 per cent. solutions are tinted by oak and redwood.

Both strong hydrochloric acid and sulphuric acid give rise to profound changes in all the woods. The lignocellulose is attacked, furfural and acetic acid are liberated, and a black soft residue remains.

Fir stands the action of sulphuric acid better than the other woods. It is the only one not coloured by a 25 per cent. solution. Oak and redwood, as before, are coloured, even by a 1 per cent. solution. The other woods require a 15 per cent. solution to extract colour from them. The action of nitric acid is rather curious. Even in very dilute solutions it is coloured deep yellow by all the woods; it appears to attack the ligno-celluloses of the wood substance, converting them to insoluble celluloses. This action seems to depend on the presence of nitrous acid, and is arrested if urea be present. Of the other liquids tested it is perhaps interesting to note that whilst sodium bisulphite solution is coloured slightly by all the wood, with oak a definite precipitate is formed.

The foregoing remarks apply to cold liquids. With hardly an exception the liquids when hot are deeply coloured by all the woods.

Absorptive Capacity

Turning now to the question of absorptive capacity, comparative results are best obtained by determining the coefficient of absorption of each wood for different liquids, and defining this coefficient as the weight of liquid absorbed per unit volume of wood. In carrying out the determinations, the test-pieces of wood were immersed in the liquids at room temperature for eight days; they were then removed, dried with a cloth, and exposed to the air for 45 minutes, after which they were weighed. Table I. gives the mean value of the coefficient of absorption for the six woods with various liquids.

It must be remembered that the coefficient of absorption varies both with the temperature of the liquid and with its concentration. These variations appear to follow no definite law, and the curves accompanying this article clearly illustrate this irregularity.

An examination of these curves, in conjunction with Table I., is of interest.

TABLE I.

COEFFICIENTS OF ABSORPTION

(GMS. PER CUBIC CENTIMETRE × 10.)

Liquid	Cypress	Fir	Pine	Redwood	Maple	Oak
Water	2·34	3·1	3·0	3·6	5·4	4·0
Hydrochloric Acid	2·3	2·6	2·4	2·8	4·2	3·6
Sulphuric Acid...	2·2	2·0	3·1	3·1	4·1	2·6
Nitric Acid	2·2	2·7	2·3	2·8	4·8	3·8
Caustic Soda	4·0	5·7	4·3	6·0	5·7	7·0
Sodium Carbonate	2·0	3·6	2·5	4·2	4·2	2·4
Bleaching Powder	1·5	2·0	1·3	3·1	3·9	1·6
Sodium Bisulphite	3·6	3·3	1·8	4·4	4·4	2·5
Sodium Chloride.	1·0	1·6	1·2	3·1	3·5	1·3
Turpentine	2·5	1·6	0·7	3·1	1·9	0·7
Linseed Oil	1·2	2·0	1·0	3·0	1·6	1·0

It was remarked that fir did not impart colour even to 25 per cent. sulphuric acid. Table I. shows that it has the lowest coefficient of absorption of all the woods for this acid. Fig. 1 also shows that the coefficient is practically constant for all concentrations of the acid between 1 per cent. and 25 per cent. In the case of the other woods, the absorptive capacity tends to decrease with increasing strength of the acid up to about 10 per cent. when there is a sharp and continuous increase. With caustic soda, as would be expected, the coefficients are unusually high. With increasing strength of solution they tend to a maximum value at about 10 per cent. strength, and thereafter decrease. Redwood is an exception since its coefficient steadily decreases in magnitude. Of all the woods, maple has the greatest coefficient for all liquids with the exception of organic liquids and caustic soda, and redwood comes second. Tests carried out with hot liquids show that hot water is absorbed to a greater extent than any other liquid. Also with the exception of caustic soda, hot liquids are absorbed in greater amounts than cold liquids.

The absorptive capacity of a wood for a liquid is closely related to its change in volume when in contact with that liquid. All woods expand when exposed to cold aqueous solutions, known as the temporary expansion; when removed from the solution and allowed to dry they do not resume their original dimensions, but are found to have acquired a permanent expansion or contraction dependent on the nature of the liquid in which they have been emersed. These changes in dimension are very important in tank design, and have to be fully considered by the tank engineer.

Table II. and Figs. 3 and 4 give the results of experiments carried out to determine the nature and extent of the change produced by various liquids and different concentrations of the same liquid. In all cases the expansion is expressed as the percentage increase on the original dimension. The permanent expansions and contractions were measured after air drying the saturated test pieces for one week.

TABLE II.

TEMPORARY AND PERMANENT EXPANSIONS (NEGATIVE SIGN INDICATES A CONTRACTION).

	Cypress		Fir		Pine		Redwood		Maple		Oak	
	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.
Water	2·5	1·0	6·5	0·5	8·0	2·5	8·0	3·5	8·5	1·5	5·0	1·0
Hydrochloric Acid	5·8	3·8	5·4	3·1	6·5	3·3	9·1	7·6	9·0	5·1	6·5	3·4
Sulphuric Acid	5·8	4·5	3·9	2·4	7·1	4·4	7·6	6·9	8·4	5·2	3·9	1·8
Nitric Acid	5·3	2·5	5·5	0·8	7·3	2·0	11·8	9·7	7·7	0·5	3·3	−1·3
Caustic Soda	5·3	1·9	8·4	1·1	7·4	2·4	13·6	10·1	13·0	−2·8	5·4	−5·3
Sodium Carbonate	5·0	1·5	5·5	2·5	6·5	3·5	5·5	5·0	7·8	2·0	3·9	1·3
Bleaching Powder	4·2	1·0	3·5	−0·4	5·0	1·0	2·7	−4·7	5·0	−3·0	2·5	−0·8
Sodium Bisulphite	5·5	3·5	5·0	1·8	5·5	2·2	5·5	3·3	8·7	4·0	3·0	1·8
Sodium Chloride	4·0	2·5	4·0	2·2	4·5	1·5	9·5	5·5	6·3	3·5	1·8	1·0
Turpentine	0·5	0·0	0·5	0·0	0·0	0·0	−0·5	−0·5	0·0	0·0	0·0	0·0
Linseed Oil	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	−1·2	−1·2

It will at once be apparent that there is a great similarity between the curves in Figs. 1 and 2 and those in Figs. 3 and 4, the tendency to form a minimum in the case of sulphuric acid and a maximum in the case of caustic soda being very marked. It may thus be taken as a rough generalisation that the temporary expansion of a wood is proportional to the amount of liquid absorbed.

From an inspection of Fig. 3, it will be seen that for low concentrations of the acid the permanent expansion is in all cases less than the temporary expansion, but that they tend to a common value at higher concentrations. The behaviour with caustic soda is very different; with scarcely an exception, the temporary expansions are much greater than the permanent expansions for all concentrations. Further, in the case of fir, maple, and oak, there is, for low concentrations, a permanent shrinkage of the wood. Caustic soda is not unique in this respect, since nitric acid, sodium sulphide, and bleaching powder solution produce the same effect.

Summarising the results, it may be stated that for all

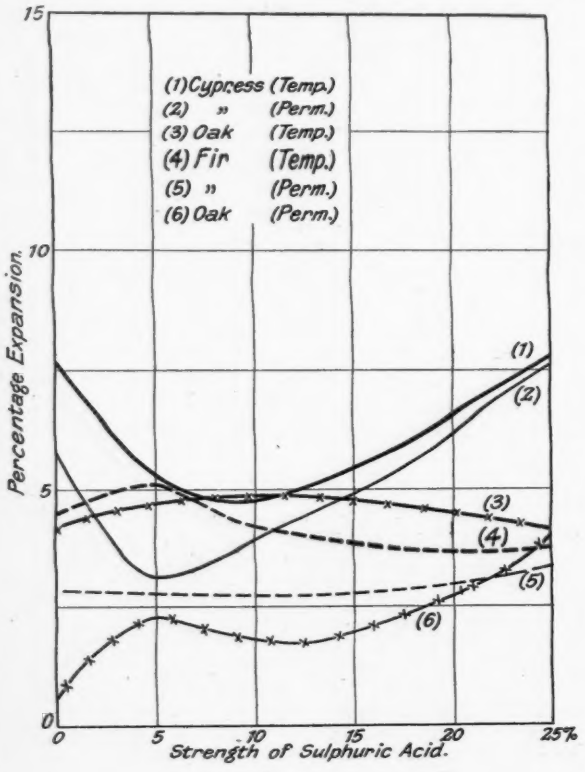


FIG. 3.

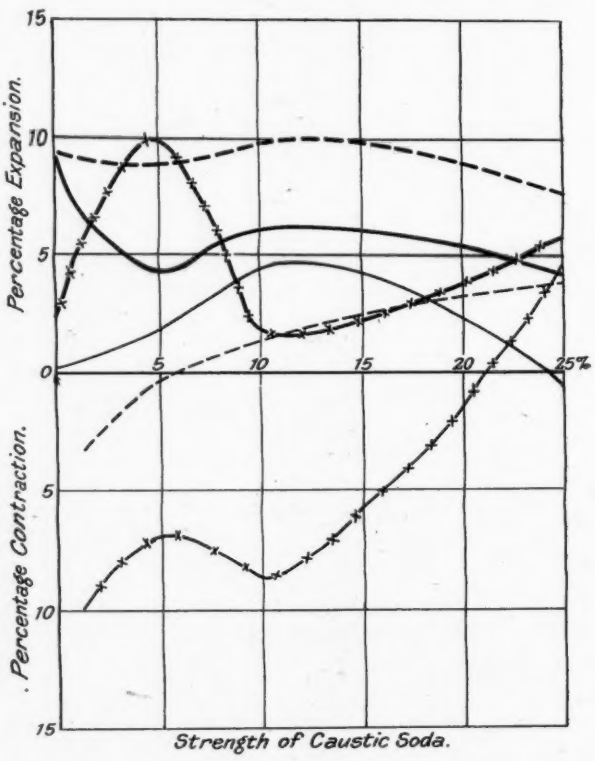


FIG. 4.

liquids, redwood shows the greatest expansion, and oak the least. Oak, and indeed maple, often show contractions. Cypress and pine never show shrinkages in cold aqueous solutions. Cold organic liquids usually produce no change in dimension of wood.

Effect of Hot Liquid

Nothing has yet been said of the effect of hot liquids. As a general rule, hot liquids cause a definite permanent shrinkage of all the woods, even such woods as cypress and pine contracting under the influence of hot caustic soda and hot nitric acid. In addition to the properties we have already considered, it is necessary to know, before selecting any particular wood to construct a tank, to what extent the mechanical strength and hardness of the wood are effected by the liquid to be contained by the tank.

In the experiments carried out by Hauser and Bahlman, the test pieces of wood, after contact with the different liquids for thirty days, were tested for strength, hardness, and elasticity. It was found that those woods which for any particular liquid had a high coefficient of absorption, suffered big alterations in dimensions, and caused pronounced colouration of the liquid; they also showed a corresponding deterioration in physical properties. As an example, redwood may be taken. This wood, it will be remembered, had a high coefficient of absorption, and showed on the whole the greatest changes in dimensions. The test pieces were rendered brittle by 5 per cent. hydrochloric acid and 1 per cent. sulphuric acid. Nitric acid of 5 per cent. strength coloured it deep yellow and rendered it soft and friable. Dilute caustic soda has a similarly destructive effect, whilst even a solution of common salt, which was without any effect on the other woods, caused the redwood to become brittle.

Of all the woods tested, cypress was found to withstand the action of the greatest number of chemicals. Its mechanical strength is not materially altered by 25 per cent. sulphuric acid, — 10 per cent. nitric acid, and it is the only wood that does not undergo destruction by boiling 25 per cent. caustic soda. Next in order of merit as a wood of fairly general application is pine. Pine is especially resistant to hydrochloric acid, and is the only wood not badly attacked by the 50 per cent. acid. Maple, oak, and redwood are woods of limited application.

A critical examination of the above results will enable the chemical engineer to form a very fair estimate of the possibilities and limitations of wooden tanks. For any particular liquid there is always some wood which is particularly resistant to that liquid, and which should be selected for building the tank. Caustic soda and nitric acid are exceptions to this generalisation; they cannot satisfactorily be stored in wood. The same applies to most hot alkaline and acid liquids.

Settlement of Soap Works Dispute

A DISPUTE between the Attorney-General and the Spenborough Urban Council and Hinchliffe and Son, Ltd., was announced as settled in the Vacation Court on Wednesday. This was a case in which the plaintiffs asked for an injunction to restrain the defendants, until a trial of the action, from causing or permitting effluvia to proceed from their oil and soap works at Liversedge so as to be a nuisance or injurious to the health of the inhabitants of the district. The matter was before the Court a fortnight ago, when it stood over upon Mr. Fuller, representing defendants, giving an undertaking in the terms of the notice of motion. Mr. Wood, for the plaintiffs, now informed the Court that, although the defendants had, in the interval, not filed any affidavits, they had consented to treat the motion as a trial of the action, and submit to a perpetual injunction, in the terms of certain minutes signed by the parties. That would put an end to the whole matter. Counsel representing the defendants assented to this course.

Duties on Dyes for U.S.A.

THE United States Tariff Bill, as amended by the Senate, was passed by that body last Saturday by forty-eight votes to twenty-five, and by the time these lines are before our readers the House of Representatives will probably have taken the steps necessary to send the revised draft to a conference of both Houses. In its present form the Bill is an almost complete revision of the original one, the amendments numbering more than two thousand, of which a large majority represent considerable increases over the rates passed by the House. The duties on dyes and other coal-tar products, as voted by the Senate on August 17, consist of a duty of 10.5 cents per lb., plus 90 per cent. *ad valorem* on finished dyes, etc., and 10.5 cents per lb. plus 75 per cent. *ad valorem* on others. Of the new features which have been added to the Bill by the Senate, probably the most important is the clause granting to the Chief Executive power to vary rates if, after investigation by the Tariff Commission, he should find that the disproportion between the cost of production in America and abroad should warrant such action. Another clause provides for the establishment of a free-trade zone at large American ports, where raw materials could be imported, manufactured and exported again direct without payment of Customs duties.

Japanese Sulphuric Acid Manufacture

DURING the war considerable progress was made in the manufacture of sulphuric acid in Japan, and, despite the curtailment of production which has been necessary of late in other Japanese industries, the sulphuric acid industry has not been seriously affected. The remarkable development of the industry is illustrated by the following figures, published in *The Yakugyo Shuho*, showing the yearly output of sulphuric acid since 1914: 1914, 472,905,094 lb., valued at yen 3,004,226; 1915, 492,026,672 lb., valued at yen 4,702,669; 1916, 781,425,538 lb., valued at yen 10,844,860; 1917, 1,224,778,240 lb., valued at yen 14,762,952; 1918, 1,276,421,440 lb., valued at yen 19,448,220. In 1918 there existed 38 factories for the manufacture of sulphuric acid employing 2,113 workpeople. The subscribed capital of these companies amounted to yen 83,697,000 of which yen 52,612,000 was paid up. As a result of the business depression consequent on the termination of hostilities, the output in 1919 dwindled to 710,212,000 lb., valued at yen 17,953,000. In 1920 production showed a further decrease of more than 30 per cent. on that of the preceding year.

New Income Tax Provisions

To the Editor of THE CHEMICAL AGE.

SIR,—The Finance Act, 1922, just passed into law, contains more than the usual number of yearly amendments, etc., of Income-tax law. There is also no doubt of the unusual and general importance of the principal provisions, which are as follows:—

(1) Interest and dividends, etc., received in full become assessable for the first year of receipt, adjustment being provided in certain cases for the second and third years of assessment.

(2) All employees are now chargeable on the current year's earnings, and the "average" is discontinued.

(3) Income under certain revocable and other dispositions (as set out in Section 20) is to be deemed to be the disponor's income for taxation purposes.

(4) Undistributed income of certain companies which is withheld from distribution may now, "with a view to preventing the avoidance of the payment of Super-tax," be charged to Super-tax in accordance with Section 21.

(5) Super-tax payers may now be required to furnish particulars as to the sources and amounts of income.

There are a number of other provisions which are merely of secondary interest to the general body of taxpayers.—

Yours, etc.,

W. R. FAIRBROTHER.

67-68, Cheapside, London, E.C.2.

Development of Indian Chemical Industry

IT is reported from Bombay that the expansion of the manufacture of sulphuric acid and the establishment of works for the manufacture of paint materials has been recommended by the Bengal Agricultural and Industrial Committee.

Chamber Plant for the Simultaneous Production of Oleum and Chamber Acid

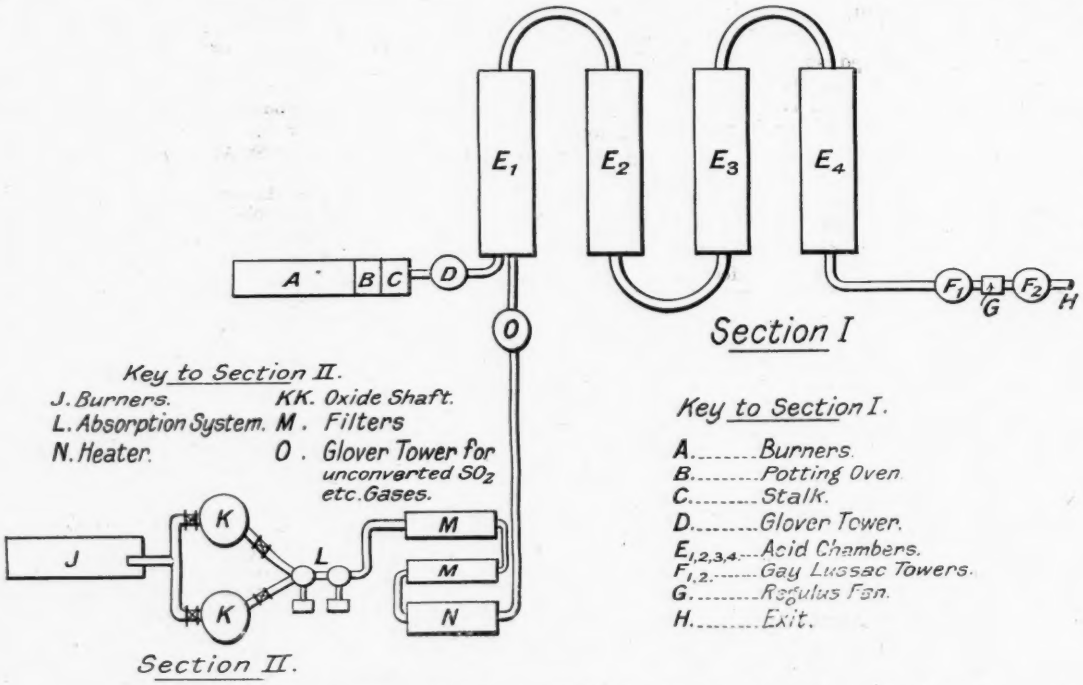
The author, well known as a works engineer, deals with a typical chemical engineering problem, which should be of considerable interest to all concerned with the design of chemical plant.

It can hardly be said that a suitable plant has yet been evolved for the simultaneous manufacture of high-strength acid (oleum) and chamber acid on a plant which is essentially of the chamber type. The need for such a plant becomes increasingly imperative.

There is a limit to the economic utility of a cascade concentration plant, and equally to the Kessler, Gaillard, Gilchrist, and other such acid-rectifying plants as regards the strength of the acid produced. The wide difference in the capacity of concentration plants when producing acid of (say) 92 per cent. H_2SO_4, and acid of (say) 96 to 98 per cent. H_2SO_4, makes this evident. In point of fact, many works managers have reached the conclusion that the cascade concentration plants, as also the Kessler and other such installations, are not suitably adapted for the production of the latter strength of acid.

The procedure at many works when meeting demands for 96 to 98 per cent. acid is to work the concentration plant to its economic limit, say 92 to 94 per cent. (according to the experience and view of the particular works as regards strength of acid), and to fortify with oleum, purchased from an outside works, in a suitable mixing plant, to the specific strength required. There are obvious disadvantages (not necessarily technical) attaching to such a method, but these need not be stated. A chamber plant to fulfil the dual purpose under review has been tried at one or two works throughout the United Kingdom, but the results, to a large extent, have been disappointing. Here we have a typical example of a chemical engineering problem, if chemical engineering connotes the combined activities of the chemical engineer and chemist.

The basis of the process, as hitherto applied, may be briefly described thus: The burner gases arising from an ordinary type of combustion plant, with spent oxide, pyrites, or sulphur as the raw material, have been passed through an oxide shaft such as is used in connection with the Mannheim oleum plant. Conversion of the sulphur dioxide to trioxide up to 30 per cent. is known to have taken place under the most favourable conditions, but for the most part there was no regularity in the operation. The gases emerging from the oxide shaft were passed through absorption towers, through which strong sulphuric acid was circulated in order to absorb the sulphur trioxide in the production of oleum or high-strength acid. The unabsorbed gases in at least two plants of which the writer has knowledge were taken direct to a series of partially packed tower chambers which were irrigated with nitrous acid. This portion of the plant was assigned for the production of chamber acid.



Diagrammatic Sketch of Chamber Plant suitable for the simultaneous production of Oleum and Chamber Acid

It is interesting now to examine the causes of the disappointing results arising from the operation of such plants. Broadly, these may be classified under three headings—(*a*) failure to ensure constant conditions in the operation of the oxide shaft, (*b*) the low SO_2 concentration of the gases emerging from the absorption system reacted only sluggishly with the nitrous acid, and high escapes on the exit of the plant resulted, and (*c*) an absence of proportion as regards the two distinct operations involved. The first two questions essentially concern the chemist.

It is known, as a result of investigation which has been undertaken and published since the plants under review ceased to operate, that certain optimum temperature con-

ditions were necessary for ensuring constant conversion. Moreover, the iron oxide should be in lumps of a certain size, having adequate porosity if maximum conversion is to be attained, and the burner gases should be free from dust.

Much valuable data in connection with these various aspects, as well as affecting the control of the oxide shaft, is to be found in Volume 5 of *Technical Records of Explosives Supply*, recently published by the Ministry of Munitions and the Department of Scientific and Industrial Research. This latter body, along with Mr. Macnab, is to be congratulated on the interesting character of these records, which are bound to be of considerable assistance in affording a solution of this aspect of the chemical engineering problem under review.

Aspects (*b*) and (*c*) are inter-related to some extent, in that there is evidence available which leads to the conclusion that below a concentration of 3·5 per cent. of SO_2 gases will not react at all satisfactorily with nitrous acid, and especially is this the case if the temperature of the gases is comparatively low.

This leads to the final point. How can the SO_2 concentration of the unabsorbed gases leaving the absorption system be augmented and rendered suitable for reaction with nitrous acid? Experience suggests (*a*) that this can only be attained by sectionising the two operations, and by adopting a due sense of proportion in the design of the plant, and (*b*) by effectually removing the acid mist from the gases leaving the absorption system of the strong acid section, and preheating these to such a temperature as will allow of reaction in a small Glover tower.

Reference to the diagrammatic sketch will show that the design of plant which, in the writer's view, is calculated to achieve the dual purpose under discussion contemplates a division of the functions involved. One section—No. 1—is essentially a chamber acid plant, and section 2 is essentially a plant for the production of strong sulphuric acid of any desired strength above (say) 92 per cent., up to oleum of 20 per cent., and embodies, in addition, suitable apparatus for rendering any unconverted SO_2 capable of reaction in its own Glover tower, after which the remaining uncombined SO_2, etc., gases pass to the chamber system.

Section 1 should be assigned to deal with 75 per cent. of the total sulphur (whether as spent oxide, pyrites, or sulphur is immaterial), and section 2 should deal with the remaining 25 per cent. In other words, in the writer's view, it is unreasonable to expect one unit of plant to produce strong sulphuric acid, and at the same time to ensure the efficient production of chamber acid from the weak gases. A more judicious arrangement is to incorporate a small unit where a due sense of proportion is exercised for the production of the strong acid and to deal with the weak gases in a complete chamber acid system where the dilution arising from the weak gases of the strong section could not impair or retard the working.

Such an arrangement of plant as that outlined would be found feasible in operation, and by reason of its flexibility and its low initial capital cost would prove a distinct commercial proposition. Too many interesting technical aspects arise for detailed consideration in the limits assigned for this contribution, but enough has been said to whet the appetite of those who are interested in the production of sulphuric acid of varying strengths.

A Patent Fuel Merger

It is officially announced that the Atlantic Patent Fuel Works, North Dock, Swansea, have been purchased by the Reliance Patent Fuel Co., Llanelly, with the sanction of the Court of Chancery. In two or three weeks' time it is hoped to have the factories and wharves in full operation, thus providing employment for between 250 and 400 men.

The British Association Meeting

Programme of the Chemistry Section

An attendance of approximately 2,000 members is expected at the ninetieth annual meeting of the British Association for the Advancement of Science, which will be held at Hull from September 6 to 13, under the presidency of Professor Sir C. S. Sherrington.

The local executive committee are to have as their guests twenty-five exhibitioners—science students selected by the Senates from universities and university colleges throughout the country—who will be housed in training college hostels. They will not only be able to meet together for an interchange of ideas, but they will have the advantage of coming into personal touch with the heads of their various departments of science. The idea was carried out on a small scale last year by private liberality. Several institutions have offered exhibitions of their own to students.

No German visitors are expected to attend, as foreign correspondent members of enemy origin had their rights suspended during the war.

Section B (Chemistry) has for its President this year, Principal J. C. Irvine, F.R.S., whose presidential address will deal with "Research Problems in the Sugar Group." Professor G. T. Morgan, Professor A. Smithells, and Professor W. P. Wynne are Vice-Presidents; Professor C. H. Desch is Recorder; Dr. N. McCombie, and Dr. E. H. Tripp, Secretaries; and Mr. A. R. Tankard, F.I.C., is Local Secretary.

The programme of Section B will include several discussions. Principal Irvine's address will be followed by several papers on carbo-hydrates from the St. Andrews laboratories. Photosynthesis will be discussed jointly with Section K (Botany), the recent work from the Liverpool laboratories on the synthesis of the more complex plant products being represented. Sir William Bragg will describe his researches on the crystalline structure of organic compounds; and the recent theories of organic structure will be considered in a discussion on valency and polarity, to be opened by Professor Robinson, and in a paper by Professor Holleman on substitution in the benzene nucleus. Other separate papers include an account of the recent work on compressibilities under high pressures conducted in the Geophysical Laboratory at Washington, and a study of the properties of soap solutions by Professor McBain. Two discussions on industrial questions have been arranged. One of these concerns the local industry of the hydrogenation of fats, which will be considered from the scientific and the industrial side, and the other is the industry of synthetic nitrogen compounds. Several of the modern processes of synthesis will be described. Dr. J. S. Owens will speak on atmospheric dust.

The city is an important centre of chemical manufacturers, and visits of the Section to some of the principal works, including the fat and oil and the cement industries, have been arranged.

Temperature-Pressure Curves of Petroleum Products

In the course of an investigation now in progress at the laboratories of the U.S.A. Bureau of Mines into the nature of "gum-forming" constituents of gasoline, several gasolines and other petroleum products were heated in a small bomb, and pressures of considerable magnitude were developed. As the Bureau has received many inquiries for data showing the pressure that may be developed in a still when gasoline or other oil is subjected to elevated temperatures, it was thought advisable to record the pressures observed at various temperatures in the course of this work. It was found that petroleum products with a low boiling range—such as casinghead gasoline and some of the lighter motor gasolines—generate a higher pressure at a given temperature than water vapour. Petroleum products with a relatively high boiling range—such as kerosene and transformer oil—generate less pressure than water vapour at a given temperature. In general, the pressure generated by petroleum products when subjected to elevated temperatures varies inversely with the average boiling point of the product. The temperature-pressure curves, however, are not parallel, due to the varying composition of the products. For the same reason, the distillation range curves are not parallel. Details of the experiments are given in Serial 2368, just issued by the Bureau of Mines.

Pneumatic Transmission

Some Applications in Chemical Industry

MODERN requirements in many industries call for more rapid and safe transmission of papers, small goods, etc., than has hitherto existed, and it is not fully appreciated that pneumatic despatch systems can be of immense service in most industrial organisations.

In a pneumatic despatch installation the article is enclosed in a carrier, which is placed in the tube leading to the point to which the service is required, and an air-current maintained in the tube by a pump or blower sends the carrier to its destination in a minimum of time and without risk of loss or mislaying, thus dispensing with hand messengers and their attendant expense. Interested readers will find pneumatic despatch historically reviewed in Bulletin No. 32, which is obtainable from the Librarian, Institution of P.O. Electrical Engineers, Engineer-in-Chief's Office, G.P.O. (West), London, E.C., price 6d. nett.

T. Cooke and Sons, Ltd., of Buckingham Works, York, and 3 Broadway, Westminster, London, S.W.1, have had a long experience in designing and erecting pneumatic despatch apparatus for a variety of purposes, and their installations are now in use in many industries.

The application of pneumatic tubes is not confined to the transmission of papers and coin, but may be employed to a considerable extent in engineering and other works for conveying small tools and component parts from one department to another. As a means of linking up the different shops in a large factory and centralising control, the system has great possibilities. One of the latest schemes engaging the firm's attention is in connection with the conveyance of Dictaphone records between the various executives' offices and the stenographers' department in a large works. Fig. 1 is a sectional view of one type of message carrier.

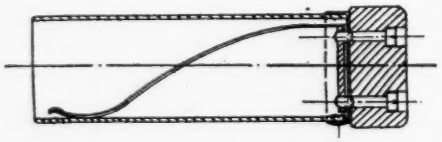


FIG. 1.

Recent investigations undertaken by Messrs. Cooke cover the question of utilising pneumatic despatch tubes in connection with the manufacture of cellulose silk. As the spools are removed from the spindles of the spinning machines they can be inserted through doors into a vacuum tube running along the front of each machine. In this case carriers are not needed, as the spools themselves fit the tubes and are carried forward in the air-current to the dyeing-rooms and other departments, thus replacing the original method of carrying them by hand in trays. Another instance in which the pneumatic-tube engineer is in a very real sense linking the chemist with the manufacturing plant is now in evidence at some of the larger steel works. Here the samples taken from the steel furnace are conveyed at express speed through pneumatic tubes to the laboratory for assay purposes, and the results of analysis are posted back with a minimum loss of time.

Hand-Worked Systems

In its simplest form the apparatus merely consists of a single tube through which messages are sent or brought back by a small air-pump, which can easily be worked by a boy or by a small electric motor. A simple movement of a lever on the pump alters the direction of the current from "send" to "receive," or *vice-versa*. The carriers are received at the "out" stations in boxes or cages, and the ringing of an electric-bell suffices to intimate to the pump operator at the central station that a carrier has arrived or that one needs bringing back. For efficiency and simplicity in small installations, such as are required in offices and warehouses with tubes up to a few hundred feet in length, a hand-worked message despatching system has much to commend it, owing to cheapness of installation and economy in operation. Any number of tubes to different stations may be worked by the same pump when fitted with a simple switch-valve. Stations at different levels can be linked up with the same ease as those on the same level.

Container Systems

In some installations a power-driven pump capable of compressing or rarefying air at about 12 lb. per square inch, above or below atmosphere, is employed, together with a series of air-reservoirs. Energy stored in these reservoirs in the intervals between the sending of messages is immediately available when a carrier is required to be transmitted. When this system is employed more than one tube can be operated at once. A further refinement consists of an automatic solenoid switch electrically operated by contacts on Bourdon pressure or vacuum gauges. When the pressure or vacuum reaches a pre-determined limit the switch automatically stops or starts the pump as required.

In a large number of cases tubes of 1½ inch inside diameter are used, this size being found sufficient for ordinary messages. Larger sizes are frequently supplied, 2½-inch diameter, with specially long double-ended carriers being convenient for the transmission of quarto or foolscap sheets by merely rolling them up. When placed above ground or inside a building the tubes are of light, seamless brass, made specially true and smooth internally to facilitate rapid transit of the carriers. The constant passage of the carriers tends to keep the interior of the tubes burnished bright. The radius of the bends is kept as large as possible, and is determined by the diameter of tube and length of carrier, being 3 ft. in the case of 1½-inch tubes with standard carriers. Underground tubes are of lead laid inside stout cast-iron or steel pipes to protect them from damage. The speed at which the carriers travel in the tubes ranges between 20 and 30 miles per hour.

Coal Tar in Roofing Materials

ONE of the early uses to which coal tar was put industrially was in the manufacture of roofing materials, states the Bureau of Mines in a technical paper recently issued. Originally single sheets of millboard were coated with tar and painted with it after they were laid on the roof. Then came the treatment of large rolls of roofing felt, which eliminated the transverse joints on the roof. The present method consists in treating special felt paper with hot tar, and removing the excess of tar by passing the felt between heated steel rollers; from the rollers the felt is run on a spindle and made up into rolls containing 250 or 500 square feet. The rolls are then wrapped in paper and are ready for the market. It is often necessary to "age" and "turn" the finished product before marketing; that is, the paper rolls are stood on end and are turned, end for end, every few days for two or three weeks, in order to keep the paper at one end of a roll from becoming "soggy." Ageing and turning are necessary because the paper sometimes has more tar on it than it can absorb at once. The use of heavy cold tar also aggravates the tendency of the paper to become soggy. Tar paper should always be stood on end when stored.

Competition of Indian Mica

A FEATURE that renders it almost imperative for the American mica producer to develop more efficient methods is the competition with cheap Indian labour, according to Oliver Bowles, mineral technologist of the Bureau of Mines. Labour costs in India are exceedingly low, and it is difficult, therefore, for Americans with their higher standards of living, and consequently higher wages, to compete successfully with the Indian product. Mining methods in India are very crude and laborious, and it is only by taking advantage of superior methods that America can hope to succeed. So long as mica mining in the United States follows similar though less striking crudities than in India, there is, he says, little hope of establishing a flourishing mica industry. Wages being the chief costs feature, it is important to so modify mining methods that more mechanical equipment may be employed, for the production per man per day may thereby be greatly increased. The continuance of the industry may depend to a considerable extent on the development of deposits in a more systematic manner through the activities of large organisations having competent engineers who not only understand the mining but who understand mica.

Catalogues Received

BARIMAR, LTD.—This firm have just issued a very comprehensive booklet in which almost every kind of engineering repair work is dealt with. We understand that readers of THE CHEMICAL AGE who are interested in welding problems may obtain copies of the booklet on application to the firm's head offices at 10, Poland Street, Oxford Street, London.

RELAY AUTOMATIC TELEPHONE CO., LTD.—A handsomely produced catalogue, which is obtainable at Marconi House, Strand, London, W.C.2, describes the Relay automatic telephone system, and points out some of its advantages. Not the least important of these is the possibility of obtaining immediate connections, clear and secret transmission of speech, the elimination of human operators, the prevention of wrong numbers, instant disconnection from any one number, and immediate re-connection to any other that may be required. It is claimed that with the "Relay" system connections are established in four seconds, whereas the same operation by manual switchboard takes from eight to ten times as long.

THE LAWRENCE PATENT WATER SOFTENER AND STERILIZER CO., LTD.—A pamphlet, which is being distributed by the company from Parliament Mansions, Victoria Street, Westminster, London, S.W.1, explains the use of specially formed sets of plates, known as "Locators" in their water heating, softening, and sterilising plants. These plates are made in various forms and styles and can be used in certain types of water boilers and tanks. The manufacturers claim that these "Locators" collect the scale from hot-water boilers, tanks, and pipes, and that they offer additional advantages in connection with the clarification of water or other liquids and the collection of solids in suspension. The plates, which are easily removable for cleaning purposes, are also claimed to have the effect of increasing the surface contact of the water.

ADAM HILGER, LTD.—This firm have issued from 75A, Camden Road, London, N.W.1, a brochure dealing with the metallurgical and analytical applications of the spectrograph, particularly the Hilger instrument, which, having a dispersive system made of quartz, gives, in addition to the visible spectrum, the important ultra-violet region in which lie so many of the distinctive metal lines. It is claimed to be sufficiently dispersive to be suitable even for the very complex spectra, such as those of the modern high speed steels. If the metals of interest do not include those which have very complex spectra, or if such metals are present in the alloy in small quantities only, a different instrument can be supplied. A photogravure of a spectrogram, showing the arc spectra of lead and copper, accompanies the pamphlet.

W. CROCKATT AND SONS, LTD.—Incorporating the Bromell Patents Co., Ltd., this company, whose offices and works are at 64, Darnley Street, Glasgow, have issued a pamphlet describing the "Simplex" patent salt detector. The instrument, as its name indicates, was designed primarily for use in marine work, to indicate the presence of salt in boiler feed water, but the makers point out that there are many other applications in connection with chemical works. It is claimed that this apparatus will give a continuous indication of any salt in the feed water, and in the event of a sudden increase of salt it gives immediate warning so as to allow the defect to be remedied before the density of the water in the boiler has increased perceptibly. Its working is based on the fact that pure water has a high electrical resistance, which, however, falls very quickly if certain compounds, of which salt is one, are added to the water.

HOLDSWORTH AND SONS, LTD.—From their head office at the Croft Boiler Works, Leeds Road, Bradford, Messrs. Holdsworth are circulating an attractive catalogue on Lancashire, Yorkshire, Cornish, vertical and multitubular boilers, and a smaller booklet devoted entirely to the Yorkshire boiler. In the former, tables are included which give the details of evaporations of the Lancashire and Yorkshire boilers, respectively, with chimney draught taken at 1,000 ft. per minute, and with coal of the calorific value of 13,000 B.Th.U's. A section devoted to useful notes for steam users, engineers, etc., deals with feed water heating, steam pipes, boiler covering, etc., and gives tables relating to the evaporation of water and percentages saved with economisers. The Yorkshire boiler booklet deals with the properties, construction and use of the boiler, and gives interesting results of a series of evaporative tests with a battery of Yorkshire boilers.

KESTNER EVAPORATOR AND ENGINEERING CO., LTD.—Booklet No. 160, which has just been issued by this firm, deals with high temperature evaporation and heating by oil circulation (Merrill patents). It is pointed out that the Merrill process of industrial heating is applicable to all processes involving the use of temperatures up to 315° C., and that it is particularly suitable for the melting of asphaltic compounds, fats, varnishes, paints, etc., and to high temperature evaporation and distillation plants. The booklet lays down the general requirements for the successful delivery of heat at high temperatures, and discusses other methods, such as steam, electricity, and direct firing. The cost of different methods of heating is shown by means of a graph, which gives the following costs per million B.T.U. for the various methods: electrical heating, £1 15s. 10d.; Merrill process (coal gas), 16s.; superheated steam, 15s.; Merrill process (fuel oil), 4s. 9d. A sectional view illustrates the general layout and working of the apparatus which comprises three essential parts only: the absorber, circulating pump and expansion tank. The company, whose offices are at 5, Grosvenor Gardens, Westminster, London, S.W.1, have installed in their London works a complete working absorber room installation which they will demonstrate to readers of THE CHEMICAL AGE at any time. This plant is also available at nominal charges, for experimental work.

THE HARDINGE COMPANY.—This company, whose London offices are at 11-13, Southampton Row, are distributing a novelty in the shape of a small glass model of the Hardinge patent conical mill, which illustrates the principles involved in the actual conical mills. The model consists of two cones, placed base to base, with a cylindrical portion between the two cones. The 60°, or shorter cone, represents the feed end of the mill and the 30°, or larger cone, represents the discharge end; the continuous feed and discharge arrangements cannot, of course, be shown in a model of this kind. The model is charged with small gravel representing the 2 in. to 3 in. pebbles, or other grinding media in the actual mill, and fine sand represents the material in its various degrees of fineness undergoing reduction. In operation the larger pieces of gravel arrange themselves at the largest diameter of the model, extending up the discharge cone in relatively decreasing sizes, and the finer sand and dust creeps up into the outlet trunnion in proportion to its fineness. In the actual mills the coarse material to be ground enters through a trunnion attached to the short cone, and is immediately subjected to the action of the largest pebbles; falling through the greatest diameter it is subdivided, and, according to the state of division, is passed along to the next zone of similar pebbles, and so on until the outlet end is reached. The operation of the model clearly demonstrates the principal result involved in the machine, but the makers state that the reason for the result has not yet satisfactorily been explained.

THOMAS AND BISHOP, LTD.—This firm issue some notes on their jointing material, "Permac," from which it appears that the inventor is a member of the firm, and has been closely associated with the chemical trade for the past forty years. A series of tests were first instituted using manganese ore and manganese ore products as a basis, and though these made for the time being a satisfactory joint, difficulty was experienced when the breaking down of a joint was considered, as these materials were found to oxidise, and the breaking down of a joint became an exceedingly hazardous operation. A successful result was only attained after many years of study and experiment principally on the effects of temperature changes, expansions, and the effects of reactions arising from the most commonly used chemicals at that time. Ultimately a jointing material was produced which, it is stated, on account of efficiency, cheapness of initial cost, and economical working, is found to be satisfactory. This jointing material, which is subjected to severe tests, is supplied in powder form and requires mixing to the consistency of a stiff window putty with boiled linseed oil, when it can be applied direct; full pressure may be turned on immediately after the joint is made, and no "following up" is required. "It ensures," the company state, "a rustless metal-to-metal joint, to withstand any pressure or temperature of steam, superheat, ammonia, ammoniated liquor, creosote oil, gas water, picric and sulphuric acid, and remains unaffected by condensation or dampness."

A. GALLENKAMP AND CO., LTD.—From 19-21, Sun Street, London, E.C.2, this company is distributing a new catalogue (List No. 76) giving a detailed description of their patented electrically heated gas sealed tube furnace, which is designed for the general heat treatment of low, medium, and high carbon steel articles, the reheating of case-hardened articles, etc. The apparatus consists of a tubular silica muffle, heated by means of a nichrome winding. At the lower end of the muffle is a seal pipe which extends into the quenching tank, in which it seals itself in the oil, water, or other medium. The upper portion of the muffle is closed by sliding doors, so arranged as to be as gas tight as possible, and the work is suspended by means of baskets, containers, or jigs, and which, raised to the required temperature, is lowered through the dip pipe into the quenching tank. In order to exclude air from the muffle during the period of heating, a seal of gas is arranged by admitting a supply of coal gas at the lower end of the dip pipe, which displaces any air in the muffle itself, and which is eventually discharged through a small blow-off pipe fitted in the top of the furnace. The booklet also contains some interesting notes on the heat treatment of steel in non-oxidising atmospheres.

OLIVER-SHERWOOD CO.—Represented in the United Kingdom by the Oliver Continuous Filter Co., 11-13, Southampton Row, the Oliver-Sherwood Co. have issued a booklet describing their "Olivite" acid pumps. "Olivite," which serves for acid proofing these pumps, is described as a substance having a rubber base, but possessing a combination of qualities found in no other material. It has, it is claimed, all the chemical resistant qualities of hard rubber without its inherent physical defects, is not brittle, has a high tensile strength, is wear resistant, and is said to be ideally adapted for the handling of corrosive solutions even under high temperatures. The pumps are claimed to be absolutely non-corrosive to all mineral and organic acids and salts, with the exception of concentrated nitric acid. The booklet gives full information regarding construction and working, and is illustrated by a number of diagrams and graphs. The application of "Olivite" to the lining of pipes, agitators, digestors, macerators, autoclaves, and for other purposes is indicated.

W. H. DORMAN AND CO., LTD.—A 24-page booklet dealing with the advantages and applications of their patented "Flexstel" expansible and flexible joints in steel and other metals from ¼ in. to 12 in. bore has been issued by this company, whose offices are at 3, St. Bride's House, Salisbury Square, Fleet Street, London. Claimed to be applicable to many trades and purposes, these joints are said to give a wide range of flexibility at varying angles for the quick discharge of heavy oils, acids, water, gas, saturated or superheated steam, and for many other industrial operations. The booklet contains a copy of a report from the National Physical Laboratory, where extensive tests were undertaken to prove the durability of the Flexstel joint. A ¼ in. bore pipeline was submitted to the Laboratory for a destructive test. The report states that the line ultimately gave out under a pressure of 9·2 tons per sq. in., when the pipeline metal actually fractured. The joint was perfectly fluid-proof until the fracture occurred.

Lord Leverhulme on Early Rising

IN an article on habits, in the current number of *Light Waves*, the house magazine of Price's Patent Candle Co., Ltd., Lord Leverhulme asks whether the fact that the United States has an enormous gold reserve is due to the American habit of early rising. Anyone visiting the United States must, he says, be struck with the great difference in English and American habits, and the difference is generally, but not always, in favour of the Americans. If one has to leave by an early train for New York, he points out, one finds breakfast in full swing at seven, and a good breakfast ready served at six o'clock in the dining-room. In London few hotel breakfast rooms are open before eight in the morning, and any breakfast earlier than that hour is a bedroom affair left to the night waiter. If you wish to get shaved in New York you can get shaved at 6 a.m. easily without any previous arrangement. He is also of the opinion that American habits of early rising, hard work and abstinence from alcohol are superior to our own. These habits, he adds, are their real gold reserve, and, like all good things in life, are within the reach of the poorest nation or individual.

Soap Manufacture in India

Increased Production and Modern Methods

IN an article in *Ungerer's Bulletin*, Mr. B. G. Sastry, M.Sc., of the Government Soap Factory, Bangalore, states that British India is rapidly becoming an important market for all grades of soap, that the average yearly importation is now in the neighbourhood of 20,000 tons, and that this total is rapidly increasing. At the same time, an approximately equal quantity is produced in India, not mentioning the large amount of locally made "Dhobie soaps," under which name is included the large variety of soaps of uncertain composition which are made in the native "factories."

Increasing Demand

As is to be expected, the Indian demand for soaps is increasing yearly and since bar soaps form the bulk of the Indian production most of the demand for toilet soaps is supplied by imported goods. Few of the Indian factories attempt this line, and only one—the Government Soap Factory, Bangalore, South India—undertakes the production of high grade toilet soaps. In this plant, milled toilet soaps of a quality comparing favourably with many of those imported are being produced. The problem of properly perfuming the soaps has been one which has hindered the development of the toilet soap industry in India, but the recent establishment of an essential oil and perfume material firm in the Mysore Government is proving to be a considerable asset to the soap makers.

The cheaper variety of soaps produced in India are highly adulterated, as a rule, being strongly alkaline and containing sodium carbonage, sodium silicate, starchy matter and earthy material such as powdered kaolin. Every attempt is being made by the Government authorities and the responsible manufacturers to fight this evil, which menaces the future of the industry. For example, the Government Soap Factory sells its own products under a guarantee of purity, and, in addition, gives free practical instruction to the small soap makers as to the proper manner of making soap by the old process, which is the prevailing method.

Native Production

The small native producers make a considerable quantity of soap in the aggregate, but the individual "factories" are amusingly small. They are really cottage industries, with an average production of 20 to 50 lb. of soap a day. The equipment of such a factory usually consists of a small kettle (frequently an empty caustic soda drum), a small vessel to store the caustic lye, a wooden frame and a hand stamping press. Such "factories" usually employ four or five hands. Their raw material is principally cocoanut oil.

The Government Soap Factory at Bangalore is in sharp contrast to these native plants. It is maintained by the Mysore Government as an experimental and demonstration factory, and is provided with all the most modern equipment required for the manufacture not only of ordinary bar soaps but of the finest milled toilet soaps. It is provided likewise with apparatus for glycerin recovery, including a vacuum evaporator. One rather unusual feature in a soap factory is the presence of several specially designed essential oil stills which produce on the spot such of the essential oils needed for perfuming as may economically be manufactured there.

Another feature is that no adulteration of any of the products is permitted. The factory is run on up-to-date lines, and is provided not only with a laboratory for the analysis and examination of raw materials but also has a good reference library and a large number of chemical and technological periodicals. It is said that it is the intention of the Mysore Government to turn the factory over to private enterprise in the near future, perhaps feeling that it has done its work of demonstrating the feasibility of soap manufacture in India.

Raw Materials

The Indian soap maker has quite a number of important advantages over his European and American competitors. In the first place, a large variety of valuable oils and fats can be had at the very doors of the factories in a fresh and sweet condition and at a low price. Tallow and palm oils are the principal exceptions. The cheaper grades of soaps can be manufactured by simple and rapid methods, especially

from cocoanut oil, which can be had at comparatively lower prices than the Western manufacturers are compelled to pay.

Labour is absurdly cheap in comparison with Western standards. The acquisition of land is not costly and taxation is lower than in most countries. Markets are at the very doors of the factories, and local tastes can be studied and catered for in a manner impossible to outside manufacturers. Moreover, the Indian manufacturer receives the benefit of an *ad valorem* duty, which must be paid by all foreign soaps and which affords him some protection.

Production of Caustic Soda

Against these advantages must be placed the fact tha- India is not producing sufficient caustic soda for her require ments. At present all soap makers are forced to depend on foreign caustic, which is naturally far more costly than in the countries of production. The competition of the Western manufacturers will always be keenly felt. Their large scale production, their scientific methods and superior organisation, their expert knowledge of processes gained as the result of long experience, their labour-saving machinery, their efficient methods of glycerin recovery and utilisation, all give them superior advantages which go far to neutralise those of the Indian producer. Most important of all must be mentioned their aggressive and effective advertising and their care in packing their products in attractively designed and decorated boxes. Some Indian factories can compete with them in a few of these points, but a combination of all these advantages is not yet to be found in India.

Hydrogenation of Oils

It is wrong to suppose that the soap industry of India has not come to stay, and it is only a question of a few years when the country will be self-contained in so far as soap production is concerned. Caustic soda production is increasing. The required machinery for the simple plants used is all being produced in India. The hydrogenation of oils offers the solution of the difficult tallow problem, which up to the present has always hindered the Indian manufacturers. India is not badly off for perfume materials and their development is progressing. Technicians are being trained and are available in ever increasing numbers.

Annual Meeting of Centrifugal Separators, Ltd.

PRESIDING at the second annual meeting of Centrifugal Separators, Ltd., held on August 18, at Winchester House, Old Broad Street, London, Sir A. Trevor Dawson (the chairman) said that during the year the company had been combating the forces which usually attend and retard the placing upon the market of a new and expensive machine, which had been accentuated by the prolonged period of depression and uncertainty of trade generally. The number of machines actually sold during the year had not been large, but the company had quite a considerable amount of business in prospect. The directors were hopeful of good business resulting from the arrangements made in America, and negotiations were pending for the handling of the continental patents. Meanwhile, as the accounts showed, the company had ample liquid funds at its command to see it through the development period. Referring to the Standardised China Clay Co., Ltd., the chairman said the company held rather more than half the share capital of that concern, which owned the sole rights of using the company's patents as far as they applied to china clay. A works erected on a clay property in Cornwall was closed when the war broke out, and these had remained unopened till this year. The Clay Co. had now been able to re-equip the works, and the latest information was that the production of clay was expected to commence again next month. With regard to the options which were granted for the subscription of "A" shares at par, representations had been made to the board by the holders of these options that a further extension might be given when they expired in October next. With that object in view, a resolution was unanimously passed authorising the directors to renew these options for a further period of two years upon the payment to the company of one penny for each share included in any option which had been renewed; options not so renewed by the option holders to be offered on the same terms to the shareholders *pro rata* to the number of shares held by them.

Egyptian Phosphate Deposits

THE actual exploitation of the phosphate deposits in Egypt, the most important of which are in the district of Salaja, at Kosseir on the Red Sea, and at Sabai, did not begin until 1908, when the output amounted to only 700 tons. This increased rapidly to 1,000 tons in 1909, and in 1910 the latter figure was more than doubled. A further improvement was shown in 1911, with an output of 6,425 tons, but the effect of development was not actually apparent until 1912, when the output reached 69,958 tons. Following that year, rail connection was established with some of the mines, with the result that Egyptian phosphate entered into foreign trade, and Egypt became a factor in the world's supply. According to an American consular report, the exports of phosphates in 1913 amounted to 64,183 metric tons, valued at £64,000. No development was reported during the war, but since the signing of the Armistice and the supply of adequate shipping facilities, the industry has rapidly advanced, until the 1920 exports (145,072 metric tons, valued at £400,000) were nearly double those of 1919 (78,425 metric tons, valued at £156,000), during which year they were greater than during any preceding year.

Brazilian Centenary Exhibition in 1922

ONE of the principal exhibitors at the Brazilian Centenary Exhibition, which opens at Rio de Janeiro on September 7, will be Nobel Industries, Ltd., who have supported the Department of Overseas Trade in this project from its inception. The company's stand will be located in the north side of the western annexe of the British Section. The exhibits, which will be exhibited under four heads, will consist of explosives ammunition, metal goods, and miscellaneous products. The explosives exhibit will include dummy blasting cartridges, illustrating the cartridges generally in use in South America manufactured by Nobel's Explosives Co., Ltd. (Glasgow), and Curtis's and Harvey, Ltd. such as gelatine dynamite, gelignite, dynamite; raw materials such as cotton, woodmeal, guhr, and nitrate of lead; dummy samples of nitroglycerine, nitric and sulphuric acids, etc.; detonators; fuse made by Nobel's Explosives Co., Ltd., Bickford Smith and Co., Ltd., and W. Bennett Sons and Co., Ltd.; igniters; exploders; and cards showing different stages in the manufacture of detonators and detonators connected up with blasting cartridges.

Among the collodion exhibits made in England by Necol Industrial Collodions, Ltd., are "Necol" Household Cement and "Necol" plastic wood, a mouldable substance which hardens on exposure to the air.

Chemical Warfare and the Law Conference

ONE of the most important matters to be considered at the thirty-first Conference of the International Law Association which opened at Buenos Aires on Thursday, is the question of restrictions on the use of chemicals in warfare and of limitations on their manufacture in time of peace. The recent death of Mr. Justice Petersen, who was Chairman of the Chemical Warfare Committee of the Association, deprives that body of one of its leading members. As recently as March of this year he drafted an exhaustive report on the question of how the manufacture in peace time of poisonous chemicals for use in war could be restricted and controlled by international regulations with a view to mitigating some of the horrors of modern warfare. This report, which is based on the Root resolutions at Washington, forms the main subject for discussion at the present Conference.

Oxidation of Ceramic Wares during Firing

IN the Study of the oxidation of ceramic wares during firing, being conducted at the Columbus, Ohio, experiment station of the U.S.A. Bureau of Mines, substantial progress is being made in the investigation of the rate of evolution of sulphur dioxide and trioxide at different temperatures and atmospheres. This work has reached a point where it was deemed advisable to check laboratory work with industrial practice. Samples of flue gases at all stages of the burn were recently collected at the plant of the Fallston Fire Clay Co., Fallston, Pa. Observations of the so-called "blue smoke" were made at this plant.

From Week to Week

AN EXPEDITION to South Georgia to obtain whale oil for Lever Brothers, Ltd., has set out from Hull.

DAMAGE estimated at several million marks was caused by fire at a large benzene store in Berlin on August 17.

THE DEATH occurred at Skelby, near Swansea, on Tuesday, of Sir John Bryn Edwards, a director of the English Crown Spelter Co.

MR. ALFRED ERNEST HAWLEY, head of the Sketchley Dye Works, died on August 19 at his residence, Leicester Grange, Warwickshire.

AN HONORARY STUDENTSHIP in chemistry at Emmanuel College, Cambridge, has been awarded to Mr. S. T. Henderson, formerly of Aske's School, Hampstead.

THE QUEBEC GOVERNMENT has decided to set aside $100,000 for the purpose of establishing a Radium Institute under the control of the University of Montreal.

CHEMICALS and allied products will be among the articles exhibited at the third Norwegian Industries Fair, which will be held at Christiania from September 3 to 10.

WE UNDERSTAND that Dr. Stephen Miall has consented to deliver an address at the Chemical Industry Club shortly on the future of the Club and of the chemical societies in this country.

IN COLLABORATION with the British Chamber of Commerce in Shanghai, the London Chamber of Commerce proposes to translate into Chinese an abridged edition of the British Pharmacopæia.

TWELVE STEAMERS are now engaged, it is reported, in the export of Wabana (Newfoundland) iron ore to Germany via Rotterdam. Payment for the present shipments is being made in English money.

THE NEGOTIATIONS between the National Flint Glass Workers' Union and the employers on the subject of wages have resulted in the acceptance by the workpeople of a reduction of 6d. per turn, to take effect from the last week in July.

A MOTION was passed at the last meeting of the Barnet District Council authorising the institution of proceedings against the Elstree Chemical Works to enforce the abatement or prohibition of an alleged nuisance emanating from their works.

A FIRE, which occasioned rather severe damage, was discovered on the night of August 17 at the works of W. H. Keys, Ltd., chemical manufacturers, Church Lane, West Bromwich. The outbreak originated amongst some barrels of oil and tar, stored in the open.

ORGANISED BY the Société de Chimie Industrielle, an International Congress on Liquid Fuels will be held in Paris from October 9 to 15. The subjects to be dealt with include petroleum, schist, lignite and peat, tar and benzol, alcohols, and vegetable oils.

AT THE ANNUAL INSPECTION of the estates owned by the Cleansing Department of Glasgow Corporation, on August 17, it was stated that the system of converting city refuse into prepared manure had been in operation for forty years, and the revenue had exceeded £250,000.

PRESIDING on August 18 at the first annual meeting of John Bell and Croyden, Ltd., Sir S. R. Alexander said that in spite of the general depression in industrial circles and the restricted purchasing power of the community, the business of the company had been well maintained.

A CORRESPONDENT of the *Times Trade Supplement* points out some of the possibilities for the employment of colloidal clay in the manufacture of soap. It will be recalled that Mr. F.E.Weston, in a recent series of articles in THE CHEMICAL AGE, gave the results of experiments which he has carried out over a long period.

MR. CHARLES ERNEST PELLEW, Professor of Chemistry at Columbia University, is the only son of Mr. Henry Edward Pellew, who, by the death of his cousin, succeeds to the title of Viscount Exmouth. It is understood that the new Viscount will not adopt the title, and that his son will now occupy the family seat as his father's agent.

IT WAS ANNOUNCED at the annual meeting of Irvine's Shipbuilding and Dry Docks Co., held on August 17, that the company had purchased the business of N. J. Fenner and H. B. Alder and Co., Ltd., paint and oil manufacturers, 120, Fenchurch Street, London. The purchase price is understood to be £240,000, of which £100,000 is in cash, and £140,000 in 8½ per cent. debentures.

A CHEMIST, with at least three years' practical experience in the manufacture of high explosives or propellants and with experience in research work in an industrial laboratory, is required by the Government of India to take charge of a manufacturing section of the Cordite Factory, Aruvankadu. Particulars are obtainable from the Director-General, Indian Store Department, Belvedere Road, London, S.E.1.

"LIMESTONE MAID," a two-year old filly, bred by the Buxton Lime Firms Co., Ltd., won the Walthew Challenge Bowl for the "best hunter" at the recent Bakewell Show, while at the Derby Agricultural Society's Show the "Best Hunter in the Show," First Prize, Special Prize, and the Hunter Improvement Society's Silver Medal were carried off. From an attendance at 22 shows "Limestone Maid" has won 19 first prizes.

IN A LETTER to the Press, Mr. W. Britton, of the Ex-Service Men's Trading Co., says that the company has for some time been handling a toilet soap made in Denmark, but they have now been notified by the manufacturers that, owing to extraordinarily large purchases of glycerin by Germany, who has bought all available supplies, they are thereby compelled to increase the price of their products. The company are further informed that the glycerin was understood to be required in Germany for explosives manufacture, and was presumably for use in factories established in Russia by German firms.

AN IRISH OFFICIAL BULLETIN, issued on Wednesday, states that following the arrest of an Irregular leader, who is described as assistant director of chemicals, raids were carried out by troops in Dublin on Tuesday, and resulted in the capture of large quantities of chemicals used in the manufacture of explosives in three premises in the city. In a business concern in Westland Row 5 cwt. of aluminium powder, 3 cwt. of potassium chlorate, and 5 cwt. of T.N.T. were found. Thirty-seven cwt. of potassium chlorate was discovered in a garage on the north side of the city. About 10 cwt. of T.N.T. was captured in a grocery establishment at Drumcondra.

MR. RICHARD RICHARDS, described as an explosives agent, of Crynant, was charged at Neath Police Court on August 18 with having sold six cases of gelignite, two boxes of compound powder, and one thousand detonators, to the Cwmtawe Colliery Co., who were not in possession of a certificate authorising them to store explosives. It was stated for the prosecution that the defendant was liable to a fine of ten shillings for every pound of explosives he sold in such circumstances. Pleading guilty, the defendant said he did not know that he had to satisfy himself that the purchasers had a certificate. Accepting his story the magistrates imposed a fine of twenty shillings.

AN EXHAUSTIVE INQUIRY was held on August 18 by the Leeds City Coroner into the causes of the explosion of an ammonia still, as the result of which two men lost their lives at the chemical works of Brotherton and Co., Ltd., Holmes Street, Dewsbury Road, Leeds. The verdict in both cases was "Accidental death," the detailed verdict being "Death due to shock following extensive burns (with fracture of left leg in one case, and of both legs in the other), such injuries being caused by the explosion of a large cast-iron still used for the manufacture of ammonia, such explosion being probably caused by the accumulation of crystals formed within the fittings of the still either on the previous closing down of the still or on its re-starting on the morning of the explosion, or so formed on both occasions."

ACCORDING TO A CABLE received from Melbourne by the Broken Hill Proprietary Co., Ltd., the report for the year ended May 31 last states that the past twelve months has been a most anxious period to all concerned. Productive operations underground at Broken Hill remained suspended owing to the impossibility of profitable working on account of Justice Edmunds' second award. Compared with pre-strike conditions, the present award has reduced the actual working time at the face from 106½ to 55 hours per week. The ore dressing mills treated 184,701 tons of tailings, producing 2,789 tons of lead concentrates, and 37,837 tons of slimes. The zinc separation plant treated 144,207 tons of tailings, producing 23,932 tons of zinc concentrates and 2,813 tons of slimes. The slimes flotation plant produced 11,081 tons of lead concentrates and 28,837 tons of zinc concentrates.

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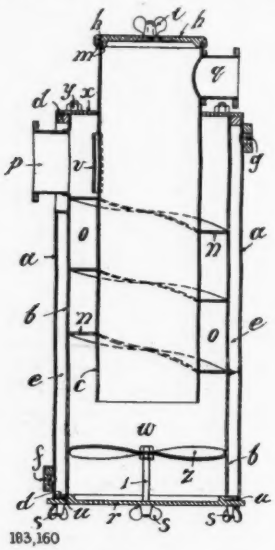
ANALYSIS.—The separation of arsenic and antimony by methyl alcohol. L. Duparc and L. Ramadier. *Helv. Chim. Acta*, July 1, 1922, pp. 552–556.

Patent Literature

Abstracts of Complete Specifications

183,160. Cooling, Cleansing, or Scrubbing Gases from all Types of Gas Producers, Apparatus for. O. B. Davies, Arden House, Woodley, Stockport, Cheshire. Application date, January 19, 1921.

A cylinder *a* is surrounded by a concentric cylinder *b* so as to form a closed annular jacket through which cooling medium circulates from the inlet *f* to the outlet *g*. An inner concentric cylinder *c* has its lower end open, and the space *o*

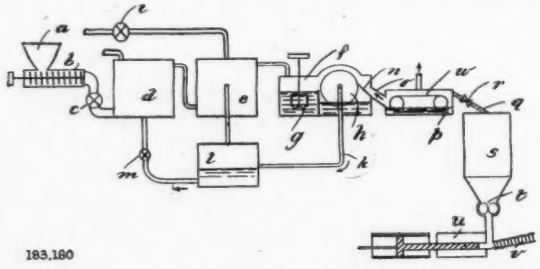


183,160

between the two inner cylinders contains a helical plate *n*. The cylinder *c* is closed at the top by a removable cover *h* and the outer cylinders *a* and *b* are closed at the top and bottom by covers *x*, *r*. The gas to be treated enters through the inlet *p* and passes downwards over the helical baffle *m* so that suspended solid matter is thrown out by centrifugal force and collects in the space *w*. A baffle *z* in the form of a propeller is mounted on a spindle *l* and deflects the gas upwards through the pipe *c* to the outlet *q*. A filtering medium of a fibrous, mineral, or metallic character may be arranged in the cylinder *c*.

183,180. Peat and the Like, Treatment of. Thermal Industrial and Chemical (T.I.C.) Research Co., Ltd., and J. S. Morgan, 52, Grosvenor Gardens, London, S.W.1. Application date, March 12, 1921.

Peat is fed from a hopper *a* into a pulping machine *b*, and then to a pump *c* which delivers it into heat interchangers *d*, *e* in which the temperature is raised to 60°–100° C. The pulp then passes to an autoclave *f*, where it is agitated by a device *g* and exposed to steam. The pulp then flows into a



183,180

compartment containing a rotary drum filter *h*, the interior of which is connected by a pipe *k* to vessel *l* and exhauster *i*. The peat forms a cake on the surface of the drum, and is partly dried in the steam space of the autoclave, while water and steam are drawn into the interior of the drum *h* and thence to the vessel *l* where the water is separated. The steam passes through the interchanger *e* to heat the incoming pulp, and the hot water is forced through the interchanger *d* where it preheats the pulp. The partly dried peat is removed by a scraper *n* and passes to a vessel *p* containing a low melting alloy at about 160° C. The peat is carried below the surface of the alloy by a travelling band *w* so that it is dried, and the steam generated passes into the autoclave and maintains its temperature at about 150° C. The vessel *p* carries a safety valve which is set to secure the desired pressure and temperature. The peat passes by the pipe *q* to a chamber *s* and thence to a briquetting machine *u*. The peat may be further dried by the flue gases from the furnace which heats the vessel *p*. The water content of the briquettes may be about 15 per cent.

183,243. Alkaline-Earth Carbonates, Process for the Grading of. W. W. Plowman, 83, St. Leonards Road, East Sheen, Surrey, and W. Feldenheimer, 20, Holborn Viaduct, London. Application date, April 19, 1921.

It is found that when a finely divided alkaline earth carbonate (including magnesium carbonate) is mixed with a dilute aqueous solution of sodium or potassium silicate, it is brought into a very finely divided or dispersed condition. The quantity of alkali silicate necessary is about 0·5 to 1·5 per cent. of the weight of the carbonate, which may be in the form of a 5–10 per cent. mixture with water. In the case of magnesium carbonate, a stronger solution of alkali silicate is necessary. The coarser portion of the carbonate remains in the solid condition and may be removed by filtration. The carbonate may be removed from its suspension by adding a flocculator such as a solution of alum or gelatine, yielding a very finely divided product.

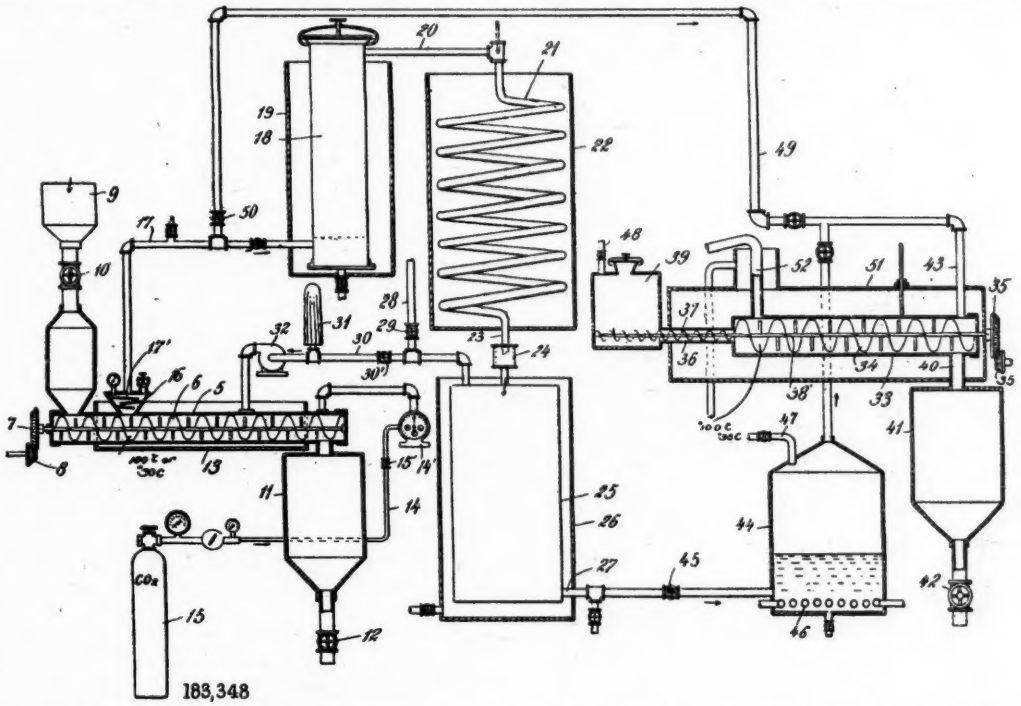
183,323. Red Oxide of Iron, Manufacture of. D. Tyrer, Stoneleigh, West Villas, Stockton-on-Tees. Application date, June 8, 1921.

The process is for producing ferric oxide pigment by heating ferrous chloride, which may be the residue obtained by evaporating galvaniser's waste. The dry granular ferrous chloride is treated in thin layers with a mixture of steam and air at a temperature of about 250°–300° C. This mixture is obtained by passing air at ordinary temperature through water at a temperature of 60° C. The steam and air should be passed over the ferrous chloride at such a rate that the condensate obtained on subsequently cooling it does not contain more than 30 grams of HCl per 100 cc. In a modification, the ferrous chloride solution is mixed with a very finely divided iron compound which will subsequently be decomposed. The preferred iron compounds are hydrated ferric oxide and ferrous carbonate such as the natural iron ores. In the case of hydrated iron oxide, the proportion added may be 60–70 per cent. In this case the reaction is accelerated by raising the temperature to 350° C. without affecting the colour of the pigment. It is found that the reaction is assisted by the presence of salts of copper, magnesium, tin, sodium, or potassium in the proportion of 0·1–1 per cent. of the ferrous chloride.

183,348. Hydrocyanic Acid, Method of Producing. H. G. C. Fairweather, London. From the Air Reduction Co., Inc., 342, Madison Avenue, Manhattan, New York. Application date, July 6, 1921.

The process is for producing hydrocyanic acid from cyanides, or from raw products such as are obtained by heating a mixture of alkali metal compounds and carbon in the presence of nitrogen, or from crude cyanide products obtained by heating calcium cyanamide with an alkali salt such as sodium carbonate or chloride. Pure alkali metal cyanides may also be obtained from crude products containing cyanides. The process consists in treating the crude cyanide with carbon dioxide in the presence of water under conditions which are regulated so as to prevent the polymerisation of the hydrocyanic acid produced. It is found that a theoretical yield of hydrocyanic acid is obtained if the temperature of the reaction is maintained at about 0° C. The yield at 30° C. is about 50 per cent., but if the temperature is raised to 130°–150° C. the

reaction proceeds very rapidly and a yield of about 80 per cent. is obtained. The raw material is moistened with 5–20 per cent. of water and is supplied from the hopper 9 to the reaction chamber 5, which contains a worm conveyor 6 and is surrounded by a jacket 13 which either contains a cooling medium if the reaction is to take place at 0° C. or a heating medium such as steam or oil if the reaction is to take place at 130°–150° C. Carbon dioxide is supplied from a container 15 through a pipe 14 to the chamber 5, and the gaseous hydrocyanic acid passes from an outlet 16 to a pipe 17, and thence to a drying chamber 18 containing sodium bisulphate or calcium chloride. A surrounding jacket 19 maintains the temperature at 30°–50° C. to prevent condensation of the hydrocyanic acid. The dry acid then passes to a cooling coil 21 and a vessel



22, so that the gas is liquefied and delivered to a jacketed receiver 25. Any uncondensed acid and carbon dioxide are withdrawn by the pipe 30 and delivered again to the reaction chamber by a pump 32. Instead of carbon dioxide, a gas containing it, such as furnace gas, may be used. Chemically pure alkali metal cyanides may be obtained by absorbing the hydrocyanic acid gas in an alkali metal hydroxide. In this case the hydrocyanic acid passes to a vaporiser 44, and the gas passes by a pipe 43 to an absorption chamber 33, having a worm conveyor 34. The alkali metal hydroxide is supplied from a hopper 39 by means of a conveyor 37, and the resulting cyanide passes through an outlet 40 to a receiver 41. The absorption reaction may be controlled by admitting air through a pipe 47. It is necessary to regulate the temperature of the chamber 33 to prevent polymerisation of the hydrocyanic acid. When solid metal hydroxide is used the temperature may be either about 0° C., or about 120°–150° C. The higher temperature is preferable as the resulting cyanide is freed from combined water. If a solution of alkali metal hydroxide is used, the temperature should be maintained at about 0° C. The gaseous hydrocyanic acid may be supplied directly through the pipe 49 if it is substantially free from carbon dioxide.

183,351. Benzanthrone Derivatives, Manufacture of. Dyestuffs Corporation, Ltd., Imperial House, Kingsway, London, A. G. Perkin, The University, Leeds, and G. D. Spencer, Calcutta, Yeadon, near Leeds. Application date, July 12, 1921.

The process is for converting benzanthrone into hydroxy benzanthrone by direct oxidation, and converting this compound into amino benzanthrone by heating under pressure with strong ammonia. It is found that if benzanthrone is heated under pressure with strong caustic potash or soda solution, a chlorate or nitrate, and anthraquinone, a quantitative oxidation of benzanthrone into the hydroxy compound is obtained. The anthraquinone acts as an oxygen carrier and may be recovered with only slight loss. The anthraquinone may alternatively be used as an oxidising agent without any chlorate or nitrate. In an example a mixture of benzanthrone 50 parts, anthraquinone 50 parts, alkali hydroxide 300 parts, sodium chlorate or nitrate 35 parts, and water 75 parts is gradually heated in an autoclave and kept at 250°–265° C. for three hours. The mixture is treated with boiling water and the anthraquinone washed, filtered off, and used again. The alkaline solution of hydroxy benzanthrone is treated with carbon dioxide or a stronger acid to precipitate hydroxy benzanthrone. If the product is heated with strong ammonia in an autoclave to 220°–230° C., amino benzanthrone is produced and may be obtained by diluting the product and filtering.

Note.—Abstracts of the following specifications which are now accepted appeared in The Chemical Age when they became open to inspection under the International Convention :—156,698 (Nitrogen Corporation) relating to ammonia synthesis and a catalyst therefor, see Vol. IV., p. 377 ; 159,461 (Bakelite Ges. and R. Hessen) relating to condensation products from phenols and aldehydes, see Vol. IV., p. 566 ; 163,980 (Barrett Co.) relating to manufacture of formaldehyde, see Vol. V., p. 138 ; 170,264 (K. Kobayashi) relating to manufacturing liquid hydrocarbons from fish oils, see Vol. V., p. 742 ; 171,075 (Trent Process Corporation) relating to distilling oils, see Vol. V., p. 846 ; 171,078 (Farbwerke vorm Meister Lucius and Bruning) relating to stable, dry, and readily soluble vat preparations for dyeing, see Vol. V., p. 846 ; 174,040 (Chemische Fabrik Griesheim Elektron) relating to synthesis of carbon disulphide, see Vol. VI., p. 353.

International Specifications not yet Accepted

181,678. Alumina. G. A. Blanc, 56, Via Fontanella di Borghese, Rome. International Convention date, June 16, 1921:

A solution of alum is treated at a temperature near its boiling-point with aqueous ammonia in the form of spray, or preferably with gaseous ammonia which is injected. The alumina is precipitated in a form in which it is readily filtered. The solution of potassium and ammonium sulphates is fraction-

ally crystallised, and the mother liquor used for dissolving more alum. The process may be applied to the hot solution of alum obtained by lixiviation of the crude material obtained by treating leucite with sulphuric acid.

181,719. ALKALI-FERROCYANIDES. A. Dessemond, 18, Rue Bourgneuf, St. Etienne, Loire, France; and A. H. Delclève, 45, Rue de la République, St. Etienne, Loire, France. International Convention date, June 16, 1921.

Coal-gas, free from ammonia, is passed through a solution of a ferrous salt and sodium carbonate, with exclusion of air. The sulphides present are then oxidised by means of air, without affecting the ferrocyanide and sulphocyanide in the solution. The mixture is then filtered, and the filtrate contains the alkali ferrocyanide. To obtain Prussian blue, the solution is acidified and a ferrous salt added, and the precipitate then oxidised by means of air.

181,722. TIN-SCRAP, RECOVERING TIN FROM. C. Clerc, 29, Rue d'Astorg, Paris, and A. Nihoul, 29, Passage des Favorites, Paris. International Convention date, June 15, 1921.

Tin-plate is agitated under reduced pressure, with a solution of ferric or stannic chloride, which dissolves the tin. If stannic chloride has been used, the solution is then divided so that one portion contains as much total tin (including that present in the stannic chloride) as has been dissolved by the whole of the solution. The tin is recovered from this solution, and the remainder is mixed with hydrochloric acid, oxidised and used again. The tin may be recovered as oxide by adding magnesia, and the magnesium chloride produced may be heated to obtain magnesia and hydrochloric acid for use in the process.

182,084. NAPHTHALENE DERIVATIVES. Soc. Anon. des Matières Colorantes et Produits Chimiques de St. Denis, 105, Rue Lafayette, Paris, A. Wahl, 14 bis, Boulevard Cotte, Enghien, Seine-et-Oise, France; and R. Lantz, 226, Rue Lafayette, Paris. International Convention date, June 18, 1921.

1–halogen–2–naphthols are heated with primary arylamines in the presence of solvents or finely-divided metals to produce 1–arylamino–2–naphthols. Examples are given in which 1–chlor–2–naphthol is boiled with excess of aniline to obtain 1–phenylamino–2–naphthol, which melts at 153°–154° C.; 1–brom–2–naphthol is heated with excess of *p*–toluidine at 125°–130° C. to obtain 1–*p*–tolylamino–2–naphthol, which melts at 137°–138° C.

LATEST NOTIFICATIONS.

184,439. Stopper for glass containers for ethylchloride and other volatile substances. Bengue, J. August 11, 1921.
184,442. Process for improving artificial resins. Consortium für Elektrochemische Industrie Ges. August 12, 1921.
184,451. Method of pyrolytic distillation. Quinan, K. B. August 6, 1921.
184,454. Process for the separation of the elementary constituents of air or other gaseous mixtures, L'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procédès. G. Claude. August 12, 1921.
184,462. Waterproofing cellulose or carbohydrates of the cellulose group. Moeller, F. August 12, 1921.
184,473. Process for treating liquids. Sauer, J. N. A. August 9, 1921.
184,485. Processes for the utilisation of luminescent and catalytic substances. Marcotte, P. L. G. August 13, 1921.
184,487. High explosives. E. I. du Pont de Nemours and Co. August 11, 1921.

Specifications Accepted, with Date of Application

167,462-3. Oils and fats, Process for the purification of. N. Goslings. August 3, 1920. 167,463 addition to 167,462.
167,741. Precious metals, Process for the metallurgical treatment of materials containing. Blei-und Silberhütte Braubach Akt.-Ges. August 12, 1920.
171,391. Acetone from acetic acid, Method of manufacturing. Stockholms Superfosfat Fabriks Aktiebolag. November 9, 1920.
172,926. Copper from its ores, Process for the extraction of. P. W. Nevill and H. Soanes. December 13, 1920.
176,321. Caustic soda or caustic potash, Continuous process for the manufacture of. C. Deguide. February 26, 1921.
176,344. Hyposulphites, Process for the manufacture of. Farbenfabriken vorm. F. Bayer and Co. March 3, 1921.
183,882. Cellulose derivatives, Manufacture of. H. Dreyfus. February 9, 1921.
183,897. Organic acids into esters, Process of converting. P. Haddan. (*E. Zollinger-Jenny.*) April 4, 1921.
183,908. Cellulose compounds, Process for the manufacture of. Plausons (Parent Co.), Ltd. (*H. Plauson.*) April 28, 1921.
183,972. Caseine, Plastic material made from. R. H. Abrey. May 30, 1921.
184,036. Alcohol, Dehydration of. J. van Ruymbeke. July 15, 1921.
184,040. Retorts or furnaces. J. P. B. Webster. July 20, 1921.
184,057. Vertical gas-fired kilns for burning limestone or the like. C. F. Priest. August 3, 1921.
184,060. Gas-washers. A. Florin. August 9, 1921.
184,129. Alcohol, Dehydration of. J. van Ruymbeke. March 22, 1922. Addition to 184,036.
184,132. Titanium compounds contaminated with sulphuric acid, Process of preparing pigments from. G. Carteret and M. Devaux. June 27, 1921.

Applications for Patents

Alexander, H. M. Separating liquids of different specific gravity. 22172. August 15.
Burmah Oil Co., Ltd., and Moore, J. Apparatus for cooling oil, etc. 22167. August 15.
Consortium für Electrochemische Industrie Ges. Manufacture of resins resembling shellac. 22222. August 15. (Germany, August 27, 1921.)
Crosfield and Sons, Ltd., J., Hilditch, T. P., and Wheaton, H. J. Manufacture of base-exchanging compounds. 22091, 22092. August 14.
— Process of regenerating base-exchanging compounds after use. 22095. August 14.
Etablissements Poulenc Frères. Process for preparation of aminophenylarsinic acids. 22440. August 17. (France, Sept. 7, 1921.)
Grace, C. J. Means for separating fine micaceous and siliceous particles from china clay. 22444. August 17.
Gradl, J. Manufacture of artificial manure. 22217. August 15. (Germany, Aug. 15, 1921.)
Grogan, J. D., and Rosenhain, W. Process of improving commercial aluminium. 22454. August 17.
International Process and Engineering Corporation, and Mond, A. L. Chloridising roasting of ores, etc. 22243. August 15.
Mellor, P. H. Manufacture of clay crucibles, stoppers, etc., for steel melting, etc. 22149. August 15.
Minerals Separation, Ltd., Williams, P. T., and Broadbridge, W. Filtration and conveying of granular, etc., material. 22576. August 18.
Moore, W. M. Device for emptying benzine, etc., tins. 22415. August 17. (New Zealand, Aug. 27, 1921.)
Nobel Industries, Ltd., and Weir, J. Manufacture of detonators. 22214. August 15.
North, C. E. Process of producing milk artificially. 22240. August 15.
— Process of making butter from artificial cream. 22241. August 15.
— Process of obtaining oil from milk. 22242. August 15.
Perry, W. P. Process for treating cellulose, etc., for obtaining fermentable sugars, etc. 22211. August 15.
Poulson, A. Process of clarifying oils. 22606. August 19.
Reynard, O., Thornley, F. C., and Tapping, F. F. Process for utilisation of seaweed. 22644. August 19.
Salt Union, Ltd. and Clayton, W. C. Manufacture of hydrogen peroxide. 24045. Aug. 14.
Sim, D. J., and Smith, H. E. Manufacture of lead carbonate. 22455. August 17.
Soc. Gamichon Frères. Process of manufacture of lead oxides. 22103. August 14. (France, August 19, 1921.)
Southey, A. W. Burners for liquid hydro-carbons. 22063. August 14.

Patents Court Cases

APPLICATION has been made for the following patent to be indorsed "License of Right" under Section 24 of the Patents and Designs Acts, 1907 and 1919: 17,857/1913 (A. S. Ramage) relating to the manufacture of white lead. Any notice of opposition must be given by September 18, 1922.

Applications have also been made under Section 20 of the Patents Act for the restoration of the following lapsed patents, and these patents have been restored: 9,689/1909 (R. B. Ransford—L. Cassella and Co. G.m.b.H.) relating to derivatives of carbozole and dyestuffs formed therefrom; and 2,918/1909 (L. Haas) also relating to derivatives of carbozole and dyestuffs formed therefrom.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

LONDON, AUGUST 24, 1922.

THE chemical market has been fairly bright this week, and is slowly recovering from the effects of the holidays.

Prices are in the main firm, and the recent depreciation in the German exchange seems to have had very little effect on prices.

Export trade is also much brighter.

General Chemicals

ACETONE is firm, and stocks are on the light side.

ACID ACETIC has been in request, especially on export account, and the price is extremely firm.

ACID CITRIC continues slow, and the demand is small.

ACID FORMIC maintains its value, and a moderate business is passing.

ACID LACTIC is in moderate request, without change in value.

ACID OXALIC is firm, and a good business is reported.

ACID TARTARIC is only a quiet market, and the price is inclined to be weak.

BARIUM CHLORIDE continues scarce, and the price is extremely firm.

COPPER SULPHATE value is unchanged, and only a moderate business is passing.

CREAM OF TARTAR is fairly active, and the price is maintained.

FORMALDEHYDE is in small request, and the price is unaltered.

IRON SULPHATE is only in small request, and the price is without change.

LEAD ACETATE maintains its firm position, and the price has slightly advanced.

LEAD NITRATE continues in moderate request, without change in value.

LITHOPONE has been active, and the price is firm.

MAGNESIUM CHLORIDE is only in small request, and is offered at lower prices to come forward.

POTASSIUM CARBONATE is weak, and only a moderate business is reported.

POTASSIUM CAUSTIC also favours buyers.

POTASSIUM CHLORATE has been in much better request, and the price is firm.

POTASSIUM PRUSSIATE is as scarce as ever.

SODIUM ACETATE is in fair request and the price is firm.

SODIUM NITRITE maintains its value, although the demand is poor.

SODIUM PHOSPHATE continues very quiet.

SODIUM PRUSSIATE has again been active, and the price is well maintained.

WHITE LEAD is in fair demand at the higher figure.

ZINC OXIDE is scarce, with a good demand.

Coal Tar Intermediates

Business continues on moderately quiet lines owing to the holidays, but export inquiry certainly seems to be improving, and small parcels of goods are moving.

ALPHA NAPHTHOL is firm, with small spot stocks available.

ALPHA NAPHTHYLAMINE is steady and quiet, with a small home business in the market.

ANILINE OIL AND SALT continue unchanged.

BENZIDINE BASE has been in demand on home account.

BETA NAPHTHOL is without special feature.

DIMETHYLANILINE is slightly easier, but a fair home business has been done.

DIPHENYLAMINE is very firm, and in good demand.

"G" ACID.—Export inquiries.

"H" ACID.—Good export inquiries, and some small home trade.

NAPHTHIONIC ACID.—Price steady, and several export inquiries.

NAPHTHIONATE OF SODA.—Some home trade is moving.

PARANITRANILINE is in demand on export account.

RESORCIN.—A steady home trade, with the price unchanged.

Coal Tar Products

There is little change in the position of the market in coal tar products from last week, there being a fairly steady demand for most products.

BENZOL 90% is steady, without being particularly active, at 2s. per gallon on rails.

PURE BENZOL is in poor demand, and is worth from 2s. 4d. to 2s. 6d. per gallon.

CREOSOTE OIL is scarce for prompt delivery, and the price remains unchanged at 5¾d. to 6d. per gallon on rails in the North, and 6¼d. per gallon in the South.

CRESYLIC ACID shows no change from last week, although there appears to be little new business in the market. It is worth about 2s. 3d. to 2s. 4d. per gallon for the Pale 97/99% quality, while the Dark 95/97% quality is worth about 1s. 10d. to 2s. per gallon.

SOLVENT NAPHTHA is fairly firm at 1s. 8d. to 1s. 9d. per gallon on rails.

HEAVY NAPHTHA is in poor demand, and is worth about 1s. 8d. per gallon on rails.

NAPHTHALENE has practically no market.

PITCH.—The market keeps very firm, and makers are asking extreme prices, but there are sellers on the Continent at somewhat under the parity of current values in this country. To-day's quotations are 80s. to 82s. 6d. per ton f.o.b. East Coast, and 77s. 6d. to 80s. f.o.b. West Coast, with perhaps rather more buyers than sellers at the mean of these prices.

Sulphate of Ammonia

The home trade prices for October/November have been fixed at an advance of 6s. per ton, and there is still a good inquiry for export.

Current Prices

Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	1	8	to	0	1	10
Acetone oil	ton	77	10	0	to	80	0	0
Acetone, pure	ton	77	10	0	to	80	0	0
Acid, Acetic, glacial, 99–100%	ton	67	0	0	to	68	0	0
Acetic, 80% pure	ton	47	0	0	to	48	0	0
Arsenic, liquid, 2000 s.g.	ton	67	0	0	to	70	0	0
Boric, cryst.	ton	60	0	0	to	65	0	0
Carbolic, cryst. 39–40%	lb.	0	0	6	to	0	0	6½
Citric	lb.	0	2	3	to	0	2	4
Formic, 80%	ton	65	0	0	to	66	0	0
Gallic, pure	lb.	0	2	11	to	0	3	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	40	0	0	to	43	0	0
Lactic, 60 vol.	ton	43	0	0	to	45	0	0
Nitric, 80 Tw.	ton	30	0	0	to	31	0	0
Oxalic	lb.	0	0	8	to	0	0	8½
Phosphoric, 1.5	ton	38	0	0	to	40	0	0
Pyrogallic, cryst.	lb.	0	6	0	to	0	6	3
Salicylic, Technical	lb.	0	0	10½	to	0	1	0
Salicylic, B.P.	lb.	0	1	5	to	0	1	6
Sulphuric, 92–93%	ton	7	10	0	to	8	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	5	to	0	1	5½
Alum, lump	ton	10	0	0	to	10	10	0
Alum, chrome	ton	28	0	0	to	29	0	0
Alumino ferric	ton	9	0	0	to	9	5	0
Aluminium, sulphate, 14–15%	ton	10	10	0	to	11	0	0
Aluminium, sulphate, 17–18%	ton	11	10	0	to	12	0	0
Ammonia, anhydrous	lb.	0	1	8	to	0	1	9
Ammonia, .880	ton	33	0	0	to	35	0	0
Ammonia, .920	ton	21	0	0	to	23	0	0
Ammonia, carbonate	lb.	0	0	4	to	0	0	4½
Ammonia, chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	35	0	0	to	37	10	0
Ammonia, nitrate (pure)	ton	35	0	0	to	40	0	0
Ammonia, phosphate	ton	74	0	0	to	75	0	0
Ammonia, sulphocyanide	lb.	0	1	10	to	0	2	0

	Per	£	s.	d.		£	s.	d.
Amyl acetate	ton	175	0	0	to	185	0	0
Arsenic, white, powdered	ton	42	0	0	to	44	0	0
Barium, carbonate, 92–94%	ton	12	10	0	to	13	0	0
Barium, Chlorate	ton	60	0	0	to	68	0	0
Barium Chloride	ton	23	0	0	to	23	10	0
Nitrate	ton	27	10	0	to	30	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	1	0	to	0	1	3
Bleaching powder, 35–37%	ton	12	0	0	to		—	
Borax crystals	ton	29	0	0	to	33	0	0
Caffein	lb.	0	13	0	to	0	14	0
Calcium acetate, Brown	ton	9	0	0	to	9	10	0
" " Grey	ton	13	10	0	to	14	0	0
Calcium Carbide	ton	16	0	0	to	17	0	0
Chloride	ton	6	10	0	to	7	0	0
Carbon bisulphide	ton	50	0	0	to	52	0	0
Casein, technical	ton	47	0	0	to	55	0	0
Cerium oxalate	lb.	0	4	6	to	0	4	9
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	2	to	0	1	3
Sulphate	ton	28	10	0	to	29	0	0
Cream Tartar, 98–100%	ton	112	0	0	to	115	10	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	68	10	0	to	70	0	0
Formusol (Rongalite)	lb.	0	2	6	to	0	2	9
Glauber salts, commercial	ton	5	10	0	to	6	0	0
Glycerine, crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	5	to	0	2	6
Iron perchloride	ton	30	0	0	to	32	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	41	0	0	to	42	0	0
Carbonate (White Lead)	ton	43	0	0	to	47	0	0
Nitrate	ton	46	10	0	to	48	10	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	23	10	0	to	24	0	0
Magnesium chloride	ton	10	0	0	to	10	10	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	8	0	0	to	8	10	0
Sulphate (Druggists')	ton	13	10	0	to	14	10	0
Manganese, Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	60	0	0	to	62	0	0
Methyl acetone	ton	60	0	0	to	65	0	0
Alcohol, 1% acetone	ton	65	10	0	to	66	0	0
Nickel sulphate, single salt	ton	49	0	0	to	51	0	0
Ammonium sulphate, double salt	ton	51	0	0	to	52	0	0
Potash, Caustic	ton	33	0	0	to	34	0	0
Potassium bichromate	lb.	0	0	6½	to		—	
Carbonate, 90%	ton	31	0	0	to	33	0	0
Chloride, 80%	ton	12	0	0	to	12	10	0
Chlorate	lb.	0	0	4½	to	0	0	5
Metabisulphite, 50–52%	ton	84	0	0	to	90	0	0
Nitrate, refined	ton	45	0	0	to	47	0	0
Permanganate	lb.	0	0	9	to	0	0	10
Prussiate, red	lb.	0	4	6	to	0	4	9
Prussiate, yellow	lb.	0	1	7½	to	0	1	8½
Sulphate, 90%	ton	13	0	0	to	13	10	0
Salammoniac, firsts	cwt.	3	3	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	24	10	0	to	24	15	0
Arseniate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	5	to		—	
Bisulphite, 60–62%	ton	23	0	0	to	24	0	0
Chlorate	lb.	0	0	3½	to	0	0	4
Caustic, 70%	ton	20	10	0	to	21	0	0
Caustic, 76%	ton	21	10	0	to	22	10	0
Hydrosulphite, powder, 85%	lb.	0	1	9	to	0	2	0
Hyposulphite, commercial	ton	12	10	0	to	13	10	0
Nitrite, 96–98%	ton	31	0	0	to	32	0	0
Phosphate, crystal	ton	16	10	0	to	17	0	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	11½	to	0	1	0
Sulphide, crystals	ton	13	0	0	to	14	0	0
Sulphide, solid, 60–62%	ton	21	10	0	to	23	10	0
Sulphite, cryst.	ton	12	10	0	to	13	0	0
Strontium carbonate	ton	55	0	0	to	60	0	0
Strontium Nitrate	ton	50	0	0	to	55	0	0
Strontium Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Sulphur, Flowers	ton	13	0	0	to	14	0	0
Roll	ton	13	0	0	to	14	0	0
Tartar emetic	lb.	0	1	6	to	0	1	7
Theobromine	lb.	0	14	0	to	0	14	6
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Tin Perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	5	to	0	1	6
Zinc chloride 102° Tw.	ton	21	0	0	to	22	10	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	36	0	0	to	38	0	0
Dust, 90%	ton	45	0	0	to	47	10	0
Sulphate	ton	18	10	0	to	19	10	0

Coal Tar Intermediates, &c.

	Per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	2	3	to	0	2	6
Alphanaphthol, refined	lb.	0	3	0	to	0	3	3
Alphanaphthylamine	lb.	0	2	0	to	0	2	1
Aniline oil, drums extra	lb.	0	1	0	to	0	1	1
Aniline salts	lb.	0	1	1	to	0	1	2
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	9	to	0	4	3
Benzidine, base	lb.	0	5	9	to	0	6	0
Benzidine, sulphate	lb.	0	5	9	to	0	6	0
Benzoic acid	lb.	0	1	9	to	0	2	0
Benzoate of soda	lb.	0	1	7½	to	0	1	9
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	4	9	to	0	5	0
Betanaphthol	lb.	0	1	4	to	0	1	4½
Betanaphthylamine, technical	lb	0	6	0	to	0	7	0
Croceine Acid, 100% basis	lb.	0	3	6	to	0	3	9
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	2	9	to	0	3	0
Dinitrobenzol	lb.	0	1	3	to	0	1	4
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	5	to	0	1	6
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	2	3	to	0	2	6
Diphenylamine	lb.	0	4	3	to	0	4	6
H-Acid	lb.	0	6	6	to	0	7	0
Metaphenylenediamine	lb.	0	5	6	to	0	5	9
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	6	0	to	0	6	6½
Metatoluylenediamine	lb.	0	4	6	to	0	4	9
Monosulphonic Acid (2.7)	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude	lb.	0	3	0	to	0	3	3
Naphthionate of Soda	lb.	0	3	0	to	0	3	3
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	9	to	0	8	0
Nitrobenzol	lb.	0	0	9	to	0	0	9½
Nitronaphthalene	lb.	0	1	4	to	0	1	5
Nitrotoluol	lb.	0	1	0	to	0	1	2
Orthoamidophenol, base	lb.	0	10	0	to	0	10	5
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	1	6	to	0	1	9
Orthonitrotoluol	lb.	0	0	10	to	0	1	0
Para-amidophenol, base	lb.	0	10	0	to	0	10	6
Para-amidophenol, hydrochlor	lb.	0	10	6	to	0	11	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	7
Paranitraniline	lb.	0	3	6	to	0	3	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	5	0	to	0	5	3
Paraphenylenediamine, distilled	lb.	0	10	6	to	0	10	9
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	2	9	to	0	3	0
Resorcin, technical	lb.	0	5	6	to	0	6	0
Resorcin, pure	lb.	0	7	0	to	0	7	3
Salol	lb.	0	2	0	to	0	2	3
Sulphanilic acid, crude	lb.	0	1	0	to	0	1	1
Tolidine, base	lb.	0	6	6	to	0	7	0
Tolidine, mixture	lb.	0	2	6	to	0	2	9

Cleaning Gases and Vapours

THE processes so far used for eliminating dust, tar, oil, and other materials from gases and vapours are mainly based on washing, separation by shock, contact effects, dry filtering, or the use of electric currents. A new process known as the Freytag-Metzler method, and described in the *Manchester Guardian Commercial*, is based on a permanent renewal of the filter by the arrangement of a slowly rotating filter set which surrounds a rapidly rotating co-axial ventilator wheel. The filter rotating at a low and adjustable speed and having its filter mass renewed automatically, is only charged with an amount of washing liquid, sufficient to close the filter pores. By the evaporation of a small portion (the low-boiling portion) of the washing liquid, the gas becomes more efficient from the point of view of its heating value.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

GLASGOW, AUGUST 23, 1922.

WITH the passing of the holiday season, inquiries are more plentiful and business is expected to be brisker.

Prices are well maintained, but home consumers are restricting purchases, as far as possible, in anticipation of easier quotations.

German industrial chemicals are offered freely, but deliveries are still backward from various causes. A feature of the German chemical trade at present is the ever increasing number of dealers spreading their circulars broadcast.

Industrial Chemicals

ACETONE.—Supplies limited; quantities quickly taken up. Spot price about £70.

ACID ACETIC.—Glacial 98/100%, £54 to £56; 80% technical, £38 to £40; 80% pure, £45. Supplies scarce, and quickly taken up.

ACID HYDROCHLORIC.—In little request; prices unchanged.

ACID SULPHURIC.—No movement. Ordinary commercial 144°, £4 per ton; 168°, £7 5s.

ACID OXALIC.—8d. per lb. spot delivery, but in little request.

ACID TARTARIC.—1s. 4½d. per lb. ex store.

ALUM, LUMP POTASH.—£14 10s. per ton ex store.

ALUMINA FERRIC.—£8 per ton f.o.r.

AMMONIA CARBONATE.—Lump, 4d. per lb.; powdered, 4¼d. per lb. delivered.

AMMONIA, LIQUID, 880°.—3d. per lb. ex works.

AMMONIA, MURIATE.—Galvanisers' grey, £34 to £35. Continental offered cheaper.

ARSENIC, WHITE POWDERED, CORNISH.—In usual barrels, £44 per ton; price stiffening on rumours of shortage.

BARIUM CARBONATE, 98/99%.—£13 per ton c.i.f.

BARIUM CHLORIDE, 98/100%.—English, £22 per ton; Continental, £19/£20 c.i.f.

BARYTES, FINEST WHITE, ENGLISH.—£5 5s. per ton ex works. Continent offering large parcels cheaply.

BLEACHING POWDER.—Very quiet, at £12 15s. per ton, in usual casks ex station.

BORAX.—Crystal or granulated, £29 per ton; powdered, £30 per ton.

CALCIUM CHLORIDE.—English make £6 per ton ex quay. Continental offering at slightly less.

COPPER SULPHATE, 99/100%.—Inquiry fallen off; price £27 per ton ex quay.

DEXTRINE, YELLOW.—Offered at £18 per ton, ex store.

FORMALDEHYDE, 40 %.—Quoted £66 to £68 per ton ex works.

GLAUBER SALTS.—Rather easier on short request. £5 per ton ex station.

LEAD.—Red, £37 per ton; white, £40 per ton, delivered. In moderate request and prices firming.

LEAD ACETATE.—White, £40 per ton; brown, £35 per ton.

LITHARGE, FLAKE.—In usual casks, £31 f.o.r. works.

MAGNESITE.—Finest Euboean, £12 per ton ex store. Continent offering cheaper grade at about £9 per ton.

MAGNESIUM CHLORIDE.—Spot delivery £6 15s. per ton.

MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial quality, £7 5s. per ton; B.P., £9 10s. per ton.

POTASSIUM BICHROMATE.—6½d. per lb. Price unchanged but little inquiry.

POTASSIUM CARBONATE, 90/92%.—£31 per ton ex store.

POTASSIUM CAUSTIC, 88/92%.—Good inquiries. Price £28 to £30 c.i.f.

POTASSIUM CHLORATE.—Market dull. Crystals, 4¼d. per lb.

POTASSIUM MURIATE.—96/98%, £15 10s., basis 95%; 90/95%, £10 12s. 6d., basis 80 %, ex store.

POTASSIUM NITRATE (SALTPETRE).—Unchanged. In moderate request. Best English refined crystals, £48; powdered, £50.

POTASSIUM PERMANGANATE.—8½d. to 9d. per lb. Inquiries rather better.

POTASSIUM, PRUSSIATE YELLOW.—1s. 6½d. per lb.

SODIUM ACETATE.—Crystal £24 to £26 per ton delivered.

SODIUM BICARBONATE.—Unchanged. Refined, £10 10s. per ton ex station.

SODIUM BICHROMATE.—5d. per lb. delivered.

SODIUM CARBONATE (WASHING SODA).—£5 15s. per ton ex quay.

SODIUM CARBONATE (REFINED ALKALI).—Contracts, £7 11s. 6d. ex quay. Spot lots £9 11s. 6d. ex quay.

SODIUM CAUSTIC.—No change and inquiries slight. 76/77%, £23 5s.; 70/72%, £21 5s.; 60% broken, £24 per ton; bottoms 70/72%, £14. ex quay or station.

SODIUM HYPOSULPHITE.—Commercial, £13 to £14 per ton ex quay; pea crystals, £19 per ton. Market quiet.

SODIUM NITRITE.—Now offered at prices ranging from £29 to £31 per ton, on 100% basis, carriage paid.

SODIUM PHOSPHATE.—In casks, £17 per ton.

SODIUM SULPHATE (SALTCAKE).—Steady export inquiry. £4 per ton f.o.b. in bulk.

SODIUM SULPHIDE, 60/65%.—£16 c.i.f. U.K.

SULPHUR.—Government surplus stocks still available. £4 5s. to £4 15s. for Sicilian thirds. Sicilian flowers offered at £10 per ton ex port.

TIN CHLORIDE.—1s. 2d. per lb. in barrels.

WAX, SEMI REFINED AND WHITE PARAFFIN SCALE.—Market dull; prices nominal.

SPERMACETI.—Little doing. 1s. 4½d. per lb. ex store.

ZINC CHLORIDE, SOLID.—Offered at £22 10s. ex wharf.

ZINC SULPHATE.—Commercial in bags, £14 10s. Casks, £16 10s. Some cheap Continental parcels offering.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHANAPHTHOL.—Demand poor. Offered at 2s. 9d. per lb. delivered.

ANTHRAQUINONE.—Small home inquiry. Price quoted, 3s. 3d. per lb. delivered.

BENZIDINE BASE.—Home inquiry. Price quoted, 6s. 6d. per lb. 100% basis.

BENZYL CHLORIDE.—Home inquiry. Price quoted, 2s. 1½d. per lb. ex works.

BETANAPHTHOL.—Home inquiries. Price quoted, 1s. 2d. per lb. delivered.

BETA NAPHTHYLAMINE.—Export inquiry. Price quoted, 5s. per lb. f.o.b.

"H" ACID.—Inquiry for home trade. Price quoted, 6s. per lb. 100% basis.

META TOLUYLENE DIAMINE.—Home inquiry. Price quoted, 5s. per lb.

ORTHO XYLIDINE.—Small inquiry. Offered at 2s. per lb. delivered.

PARA AMIDO PHENOL HYDROCHLORIDE.—Home inquiry. Price quoted, 8s. 8d. per lb. 100% basis.

PARANITRANILINE.—Some home inquiries. Price, 3s. 1d. to 3s. 2d. per lb.

PARAPHENYLENEDIAMINE.—Home inquiry. Offered at 15s. per lb. delivered.

Refining of Shale Oil

CONSIDERABLE time has been spent by the United States Bureau of Mines in the experimental refining of shale oil naphtha. The work evidently confirms the finding that 70 per cent. sulphuric acid is the most effective strength to use in refining the naphtha from this particular oil. It was also found that the scrubber naphtha recovered from the activated charcoal absorber is of extremely good quality, although it is slightly over 30 per cent. saturated. Its colour is only slightly off water white and appears to be permanent. An important fact brought out in refining studies is that the gasoline obtained from the crude oil is deficient in the more volatile fractions. In order to make the gasoline meet present-day specifications, it would be necessary to blend with it some lower boiling material, which can probably be obtained by scrubbing the retort gases. For this purpose activated charcoal seems much more satisfactory than ordinary oil scrubbers, but before this fact is definitely established further work must be done.

German Chemical Trade Notes

FROM OUR OWN CORRESPONDENT.

Berlin, August 21, 1922.

THE position on the German chemical market tends to become worse as the mark continues to decline in value. Holders of chemicals can hardly be induced to sell, as they anticipate considerable difficulty in replacing stocks even at the present high standard of prices. Speculators are very active, but hardly anything is changing hands. Small parcels from weak hands are fetching record prices, and are, of course, taken up immediately.

Soda is in especially brisk demand, but supplies are inadequate and the policy of the syndicate has been the subject of criticism. Some important contracts have been concluded between German importers and foreign suppliers, but soda arriving here at present is only in comparatively small quantities.

The Benzole Association, Bochum, has fixed the following prices, ex store per kg., as from August 3 :—Tetralit benzol, mks. 46·00 ; purified B.V. motor benzol, 56·20 ; purified toluol, 59·20 ; purified solvent benzol I, 56·20 ; purified solvent benzol II, 45·50 ; benzol "vorlauf," 51·00 ; non-purified heavy benzol, 34·50.

An increase of 30 per cent. in the maximum inland prices for potash has been fixed by the Reichskalirat to take effect from August 9.

Commenting on the position of the German dyestuffs industry, the *Industrie und Handelszeitung* states that export business is suffering from British, American and Swiss competition, and the tariffs of the former enemy States, and such neutral States as Spain.

There is a firm tendency in coal tar products, with crude tar a scarce commodity.

The following quotations are given in marks per kilogram (d.=domestic price ; e.=export price) :—

ACIDS : Acetic, 80%, 80/85 mk. d. ; Glacial, 98/100%, 140 mk. d Acetyl-Salicylic, 450/500 mk. d. Benzoic, 275 mk. d ; 360 mk. e. Boric, 258 mk. d. Citric, 1,000 mk. d ; tendency firm. Oxalic, in good demand at 75/80 mk. d ; 200 mk. e. Salicylic, factory prices advanced ; trade prices are 260/300 mk. d. Sulphuric, 66° Bé., 9 mk. d. Tartaric, crystallised and powdered, 420/430 mk. d.

INDUSTRIAL CHEMICALS : Alum, potash crystal powder, 26 mk. d. ; 37 mk. e. ; chrome, 63 mk. d ; £28 per ton e. Alumina sulphate 14/15%, 17 mk. e. ; 17/18%, 26 mk. e. Ammonia carbonate, powdered, 31/34 mk. d ; 70/80 mk. e. ; lumps are very scarce and have advanced to 50 mk. d. ; 110 mk. e. Barium chloride, 38 mk. d. ; 55/58 mk. e. bleaching powder, 15/16 mk. d. ; 32 mk. e. Borax, crystallised, 127 mk. d. Calcium carbonate, precipitated very scarce at 16 mk. d. Calcium chloride, 9 mk. d. ; 12 mk. e. Copperas, 7 mk. d ; 11 mk. e. Cream of tartar, 98/100%, scarce at 275 mk. d. Dextrine, demand exceeds supplies at 55/60 mk. d. Epsom salt, 6·50 mk. d. ; 11·50 mk. e. Formaldehyde, 30%, 100/110 mk. d ; 40%, 140 mk. d ; 165 mk. e. Glauber's salt, crystallised, technical, 10 mk. d. Glycerin, 28° Bé., 260 mk. d. ; 330 mk. e. Lead, red, 120 mk. d. ; 130 mk. e. Lead, white, 110 mk. d. ; 140 mk. e. Sugar of Lead, 110 mk. d. ; 140 mk. e. Litharge, 95/100 mk. d. ; 120/125 mk. e. Lithopone, red seal, 43/47 mk. d. ; 55/60 mk. e. Magnesium chloride, fused, in barrels, 10·50 mk. d. Potassium Bichromate, 150 mk. d. 185 mk. e. Potassium Carbonate, 96/98%, 54 mk. d. ; 94 mk. e. Potash Caustic, 53 mk. d. ; 98 mk. e. ; liquor, 19 mk. d. Potassium Chlorate, 55 mk. d. ; 75/80 mk. e. Potassium Permanganate, 170 mk. d. ; in fair request from abroad at 180 200 mk. Potassium Prussiate, yellow 420 mk. d. Potash Saltpetre, 47·75 mk. d. Soda Ash, 22/24 mk. d. ; 28/30 mk. e. Sodium Benzoate, 300 mk. d. ; 340 mk. e ; short supplies. Sodium Bicarbonate, 20 mk. d. ; 35 mk. e. Soda Caustic, 56 mk. d. ; liquor, 38/40°, 16 mk. d. Sodium Hyposulphite, crystall sed, 20 mk. d. ; 30 mk. e. ; pea-form, 24 mk. d. 33 mk. e. Sodium Salicylate scarce at 375 mk. d. ; 475 mk. e. Soda Saltpetre technical 24·50 mk. d. Sodium Silicate 5·50 mk. d. 11 mk. e. Sodium Sulphide 30/32%, 17·50 mk. d. ; 19.50 mk. e. ; 60/62%, 38/42 mk. d. ; 52 mk. e. Sulphur, ground, 17 mk. d. Zinc Chloride, 39 mk. d. ; 63 mk. e. Zinc White, green seal, 120 mk. d. ; 140 mk. e. ; red seal, 100 mk. d. ; 120 mk. e.

COAL TAR PRODUCTS : Benzaldehyde in fair deman with firm tendency at 300 mk. d. ; 360 375 mk. e. Coal Tar, crude, 6.50 mk. Crude Naphthalene, 7.50 mk. d. Naphthalene, flakes, 37/42 mk. d. ; 46/48 mk. e. ; balls, 49 mk. d. ; 51 mk. e. Pitch, brown coal tar hard, 6.25 mk. ; coal tar hard, 12·25 mk. Tetralin, 34 mk. d. Decalin, 42·50 mk. d. in tank-cars.

The Nitrate Market

Producers' Large Sales Maintained

IN their report on the nitrate of soda market, dated August 22, Aikman (London), Ltd., state that since August 3 the arrivals amount to about 22,000 tons, and about 20,000 tons are due during the next fortnight. The market has been firm throughout the fortnight, and the feature has been the continuance of large sales by the Producers' Association, totalling about 215,000 tons. The demand from actual consumers has been quieter owing to the unstable exchanges and the consequent risks attached to buying in local currencies. Continental dealers, however, have been laying in stocks freely, which is a hopeful sign for next season's consumption. A fair business was reported in steamer parcels for early arrival at 11s. 6d., September-October shipment at 11s. 7½d. to 11s. 9¾d., and December shipment at 12s. 3d. per hundredweight c.i.f. In the United States the demand continues satisfactory, and considerable purchases of f.o.b. have been made by American importers.

The Producers' Association have sold about 180,000 tons September-November, 1922, 10,000 tons January-March, and 25,000 tons June, 1923, shipment, during the fortnight, making their total sales for shipment after July 1 about 685,000 tons, of which 240,000 tons are for July, 160,000 August, 165,000 September, 95,000 October-March and 25,000 tons June, 1923, shipment. The purchase of June, 1923, shipment, made in the closing days, is a feature of particular interest and indicates growing confidence in the future. The production figures for July were cabled as 81,000 tons, against 88,000 in 1921, 211,000 in 1920, and 240,000 in 1913. Stocks in Chile, July 31, were 1,577,000 tons, against 1,375,000 in 1921, 1,319,000 in 1920, and 687,000 in 1913. The shipment figures for the first fortnight of August are cabled as follow : To Europe and Egypt, 23,000 tons, against 3,000 in 1921, 33,000 in 1920, and 90,000 in 1913 ; United States, 48,000 tons, against 20,000, 70,000 and 22,000 ; Japan and other countries, 6,000 tons, against 7,000, 4,000 and 3,000.

The sulphate of ammonia market continues firm, with sellers scarce, as a result of which certain regular buyers are understood to have transferred their orders to nitrate.

Asbestos Manufacture in Quebec

ACCORDING to reports from Canada the manufacture of finished asbestos products is no longer to be confined to the United States and Europe, but the region supplying practically 87 per cent. of the world's supply of the raw material is to engage in the finished manufacture. Plans have been completed by the Johns-Manville Co., Ltd., for the enlargement of their plant at Asbestos, Quebec, where it is expected to be able to take care of all the Canadian requirements of manufactured asbestos products. The Johns-Manville Co. is, it is stated, already operating plants in Illinois and New Jersey.

Soya Bean Oil in Varnishes

ACCORDING to the *Raw Materials Review*, soya bean oil may be used in varnishes without other oils, provided that tungstates of lead, cobalt, manganese, double tungstate of lead or manganese are employed in proportions up to 6 per cent. as driers. Better results are said to be obtained when the oil is mixed with proper proportions of linseed oil or China wood oil. Cold pressed soya bean oil may be converted into a thick, viscous product with a specific gravity of .96 and over by heating it to 500° C. for from five to seven hours.

Neutralisation of Carbon Monoxide

No practical means for neutralising carbon monoxide has been found, according to the United States Bureau of Mines. One firm is reported to be working with a chemical, at present used in gas masks, which it is hoped can be adapted to use in connection with internal-combustion motors. This work is still in the experiment stage. The only practical method of overcoming noxious effects from the exhaust of internal-combustion engines in confined space is to supply ample ventilation.

Company News

CONSETT SPANISH ORE.—A dividend of 1s. per share is announced.

DOMINION GLASS COMPANY.—A quarterly dividend of 1½ per cent. on the common stock is payable on October 2.

GERARD BROTHERS, LTD.—The directors announce a dividend of 12½ per cent. on the ordinary shares for the year ended June 30.

BROKEN HILL SOUTH.—According to a cablegram from Melbourne a final dividend at the rate of 2s. per share is payable on November 3.

ELECTRO-BLEACH AND BY-PRODUCTS, LTD.—The directors announce an interim dividend of 3½ per cent. less tax, on the preference shares in respect of the current year.

JOHN OAKEY AND SONS.—An interim dividend at the rate of 2½ per cent., less tax, is payable on the ordinary shares on September 1 in respect of the half-year to June 30 last.

INTERNATIONAL PAINT AND COMPOSITION CO.—An interim dividend of 3 per cent., less tax, is payable on the preference shares on August 31, but no dividend will be paid on the ordinary shares.

LIMMER AND TRINIDAD LAKE ASPHALTE COMPANY.—Announcement is made of an interim dividend at the rate of 15 per cent. per annum, less tax, on the ordinary shares for the half year. The dividend is payable on Thursday.

DAILUAINE-TALISKER DISTILLERIES.—The directors recommend a dividend of 10 per cent on ordinary shares for the year to June 30, and a bonus of 10 per cent., both free of tax; £10,000 is placed to reserve, and £11,684 is carried forward.

JOHN BELL AND CROYDEN, LTD.—At the first annual meeting, held on August 18, the payment of a dividend of 10 per cent. on the preference shares and 6d. per share on the ordinary shares was confirmed; £21,000 is carried forward.

TARAPACA AND TOCOPILLA NITRATE CO.—The transfer books for the new issue of 400,000 partly paid shares will be closed from September 2 to 15, for the preparation of share certificates, and these will be exchanged on and after the latter date against allotment letters on which the instalment of 4s. per share, due on September 1, has been paid.

CALICO PRINTERS' ASSOCIATION.—In their annual report, the directors declare a dividend of 7½ per cent. on the ordinary shares, against 5 per cent. last year. The accounts now presented cover two years working, the net profit for the period being £503,542, to which is added £336,787 brought in. The sum of £237,000 is carried forward.

WILSON BROTHERS' BOBBIN COMPANY.—After providing for all trade charges, including depreciation, corporation profits tax, and a transfer to the reserve fund of £5,000, the net profits amount to £35,413, which added to the balance brought forward for the year ended July 15, of £6,905 makes a total of £42,318. The directors recommend a dividend of 10 per cent. and the carrying forward of £8,418. Last year's profits amounted to £49,908, and shareholders received a dividend of 15 per cent.

ARNOLD J. VAN DEN BERGH.—The accounts for the year to April 30 last show a net profit of £16,633. A dividend of 6 per cent. on the preference shares has absorbed £1,295, and 6 per cent. on the ordinary, £9,600, leaving a balance of £5,738. £574 is placed to reserve, and after allowing for all charges and taking in the balance from the previous year, there is an available balance of £11,529. A super-dividend of 1½ per cent. on the ordinary shares takes £2,400, and a dividend tax, £1,203, leaving £7,926 to be carried forward.

VAN DEN BERGH'S EMBALLAGE FABRIEKEN.—The net profit for the year ended April 30 amounted to £16,634. After deducting the preference dividend and 6 per cent. on the ordinary shares, there remains a balance of £5,738. Of this 10 per cent. is allocated to reserve funds, and 25 per cent. to directors' and supervisory board, leaving £3,730. The sum of £7,799 brought forward is added, bringing the available total up to £11,529. It is proposed to pay a super-dividend of 1½ per cent. on the ordinary shares, absorbing £2,400, and, after deducting dividend tax, £1,203, the balance of £7,926 is carried forward.

UNITED INDIGO AND CHEMICAL CO., LTD.—The report for the year to June 30 last states that after providing for depreciation of plant and machinery, bad debts, etc., there remains a profit (including £8,975 brought in) of £40,719, less Corporation Profits Tax (estimated) £2,100, £38,619. Deduct dividends already paid on preference shares for year of 5 per cent., £7,500, and on ordinary shares for six months to December 31, 1921, at a rate of 5 per cent. per annum, £2,188, leaving a net balance of £28,931. The directors recommend a dividend on the ordinary shares for the six months to June 30 at 5 per cent. per annum, £2,188; a further dividend of 7½ per cent. on the preference shares takes £11,250; and a further dividend of 7½ per cent. on the ordinary, £6,562, all less tax. £8,931 is carried forward. The annual meeting will be held at 60, Spring Gardens, Manchester, on August 30, at 11 a.m.

W. J. BUSH AND CO., LTD.—The report for 1921 states that there is a loss on trading, after providing £13,333 for depreciation of plant, etc., and allowing for debenture interest and directors' remuneration, of £87,456. This is mainly due to the disastrous fall in the prices of all commodities handled by the company. In this connection they mention that a claim has been made for the refund of a large sum in respect of excess profits duty, and a claim has also been made for the reduction of the income-tax assessment for the year. Deducting the amount brought forward from the above-mentioned loss leaves an adverse balance of £23,835. In view of the substantial reserve shown in the balance-sheet (£85,000), it was not considered necessary to defer payment of the dividends on the preference shares. This brings the adverse balance up to £30,085, which amount is being carried forward pending the settlement of the above-mentioned claims. In 1920 there was an available balance of £82,371, and, after payment of a dividend of 5 per cent., £53,621 was carried forward.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIAL.	REF. NO.
Melbourne	Sodium acetate	D.O.T. 9320
Nairobi	Oils, soap	E.D./C.P
Santo Domingo	Drugs, perfumery	——

Tariff Changes

KELANTAN.—The import duty on lime imported into the State of Kelantan is increased from 3 per cent. to 10 per cent., *ad valorem*.

GERMANY.—The surtax leviable when the "gold" duties are paid in paper currency is increased to 14,400 per cent. for the period August 16 to 22.

UNITED STATES OF AMERICA.—Further amendments of the Tariff Revision Bill, adopted by the Senate, include the withdrawal of Sections 315a, and 321. These sections proposed the continuation of the Dye and Chemical Control Act, 1921, as amended, for one year after the passage of the Tariff Revision Bill.

PORTUGUESE EAST AFRICA.—An additional duty on imports, particulars of which were published in the Board of Trade *Journal* (August 17, p. 192), applies, *inter alia*, to benzol, dynamite, denatured alcohol, gasoline, perfumery, petroleum, gunpowder, soap, and salt. Fertilisers and a number of chemicals are exempted.

CYPRUS.—New regulations governing the importation of fertilisers, effective as from July 21, specify the kinds of sacks, the method of marking the sacks with the name of the country of manufacture of the fertiliser, and with the percentage contained by any fertiliser of nitrogen, phosphoric acid, or potash, when reduced to a soluble form. Imported fertilisers must be analysed, sacked, marked, and sealed before being removed from the Customs. The regulations may be seen at the Tariff Section of the Department of Overseas Trade, 35, Old Queen Street, London.

Potash Production in the Far East

Of the countries in Far Eastern Asia only Japan is producing potash to any extent, although practically all of the countries are potential producers, possessing as they do long coast-lines or insular positions. The production of potash in its various forms from seaweed and from sea-water is of minor importance when compared to the great deposits of Europe, but when the war stopped the export of potash from Germany there was considerable activity in the preparation of this mineral from sea sources. Some interesting particulars concerning the production of potash in Japan, China, and other countries of Far Eastern Asia appear in *Finance and Commerce* (Shanghai). It is pointed out that the manufacture of soda and potash in Japan was started about 1884, but no great development has taken place, and only three or four companies are engaged in the business. Japan's exports of potassium chloride in 1918 were 3,608,102 kin, valued at yen 2,728,951, but these decreased to 1,935,146 kin, valued at yen 790,536, by 1920. In addition, Japan exports large quantities of potassium carbonate, chiefly to the United States. In 1918 shipments to that country amounted to 1,869,094 lb. This trade is of recent development, as the first shipments of importance were made in 1916, and totalled only 20,200 lb. In China the potash industry is carried on to a small extent, chiefly in the Kwangtung province. Canton is the exporting centre and ships about 40,000 to 50,000 taels worth of potash each year. Newchwang, Hankow, Wuhu, Foochow, Amoy, and Swatow make very small shipments. The exports from China go chiefly to Hong Kong, although small shipments are made to Japan, Siam, the Straits Settlements, and the United States. The Dutch East Indies export small quantities of potassium chloride, and the Straits Settlements also do a small trade in this commodity. An investigation of the seaweed collected along the coast of the Philippine Islands shows that the ash contains about 45 per cent. of potash. So far, no organised attempt has been made to develop the potash industry, but the Philippines are said to be in a position to produce large quantities of this valuable mineral from the seaweed which is found in abundance at many points on the long coast-line.

Progress in Greek Chemical Industry

In his report on the industrial and economic situation in Greece, Mr. E. C. D. Rawlins, Commercial Secretary to H.M. Legation, Athens, states that Greek industrial enterprise is small compared with that of Western Europe, but her industries are none the less important. The chemical industries are making progress, states Mr. Rawlins, and there are four glass and ceramic factories with up-to-date plant. Chemical manures are made in one large factory, and at the same works sulphuric acid is made from local pyrites. The manufacture of fertilisers is steadily increasing and is contributing to the development of agriculture. There is one factory where aniline dyes are made by the most up-to-date methods. Soap and sulphur oil are old-established industries for which the raw material is abundant, as are also turpentine oil and colophon, which are distilled from the local pine resin. In spite of her rich mineral resources, Greece has, as yet, made very little progress in the mining industry. The two mining concerns at Laurium are devoted to the smelting of lead and zinc ores and the mining of manganese. Their output has of late been restricted owing to conditions arising from the war. The value of lead and arsenic acid produced annually averages 4,000,000 drachmæ.

A Glass Manufacturer's Failure

Mr. John Southerst, Thornton Street, Collyhurst, carrying on business as the Farnworth Machine Glass Co., attended for public examination in bankruptcy on August 18, before Mr. Registrar Atkinson, at Manchester Bankruptcy Court. In reply to the Official Receiver the debtor said his liabilities were £10,000, and his assets estimated at £731. His businesses at Manchester and Farnworth were sound up to the end of December, 1920, when the slump in the glass industry commenced, and he, like everyone else in the trade, was affected. Every glass concern in the country had lost money since 1920. In a court action he consented to judgment for £6,000 and costs, and he agreed that that was the real cause of his bankruptcy. The examination was adjourned until September 29.

The Viscosity of Rubber Colloids

An account of an investigation into the effect of temperature changes on the viscosity of rubber colloids, undertaken recently at the University of Toronto, states that the varieties of rubber used were: Kassai, Cancho, fine Para, smoked sheet, pale crepe, and Esmeralda, with viscosities ranging from one to three times that of benzol. The viscosity relative to benzol was measured at 30° C. before and after temperature changes which consisted of cooling to 6° C., in freezing solid at 0° C., or at −190° C. by liquid air, or in heating up to 60° C. Cooling the colloidal solutions seemed to cause a slight increase, and freezing solid caused a greater increase; heating seemed to bring about a slight increase. These results depended apparently on the variety and the concentration. Successive applications appeared to have a cumulative effect, indicating, however, a limiting value. There was a slow recovery with time to the original or an even lower value. According to Mr. Richard Hamer, in an article in the *Physical Review*, this is a sort of hysteresis effect, and is remarkably similar to that secured on stretching a piece of vulcanised rubber. It is suggested that temperature changes, particularly freezing solid, cause a temporary polymerisation of the rubber molecules. The molecular aggregate is, however, unstable, and the forces in solution result in a later depolymerising action which lasts until equilibrium is restored.

Contracts Open

Tenders are invited for the following articles. The latest dates for receiving tenders are, when available, given in parentheses:

Australia (October 11).—Sodium acetate commercial, (5 tons). Particulars from Department of Overseas Trade (Room 53), 35, Old Queen Street, London, S.W.1. (Reference No.: D.O.T., 9320/E.D./C.P.)

London (August 29).—Refined tar. Particulars from D. A. Nicholl, Council House, Wandsworth, London, S.W.18.

London (September 11).—Lead, copper, grease, tallow, lubricating oils, linseed, etc. Particulars from W. Moon, 173, Rosebery Avenue, London, E.C.1.

Lambeth (August 29).—Disinfectants. Particulars from H. E. Anderson, Town Hall, Brixton Hill, London, S.W.2.

Dover (September 4).—Lime, paints, oils, spirits, tar, Portland cement, lead, etc. Particulars from R. Mowll, Dover Harbour Board, Castle Street, Dover.

Egypt (October 2).—Tierõl (about 3,000 litres). Particulars from Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. (Reference No.: D.O.T., 8759/F.E.)

Finsbury (September 4).—Creosote oil and tar. Particulars from Borough Surveyor, Finsbury Town Hall, Rosebery Avenue, London, E.C.1.

Warrington (August 31).—Lime, cement, tar still, glass, oil, paints, sulphuric acid, etc. Particulars from W. S. Haddock, Gas Offices, Warrington.

Durham (August 31).—Tar and tar compounds. Particulars from A. E. Brookes, Shire Hall, Durham.

Hampstead (September 7).—Pitch, tar, creosote oil, disinfectants, etc. Particulars from A. P. Johnson, Town Hall, Haverstock Hill, London, N.W.3.

Recent Wills

Mr. James Alderson, of Rectory Road, West Bridgford, Nottingham, paint and colour manufacturer	£7,082
Mr. George Harries Meager, of Trehole, Mathry, Pembroke, lately chairman of the Atlantic Patent Fuel Co.	£22,968
Mr. William Sydney Bartlett, of Copiapo, Chile, managing director of the Copper Mines of Copiapo, Ltd. (property in this country)	£981
Lieut.-Col. C. V. Monier-Williams, D.S.O., of Ramsworth, St. Barnabas Road, Caversham, lately associated with the Pulsometer Engineering Co.	£3,781
Mr. Nicholas Trestrail, A.M.I.C.E., Claremont Road, Redruth, Cornwall, inventor of concentration plants for arsenic, lead, copper, and other ores	£5,780

THE

UNITED ALKALI CO., LTD.

CUNARD BUILDING, LIVERPOOL

— *Manufacturers of* —

AMMONIA ALKALI

:: Soda Crystals ::
Sulphide of Sodium
Sulphuric Acid
Hydrochloric Acid

CAUSTIC SODA

Chlorates of Potash & Soda
Sodium Hypochlorite
:: Acetic Acid ::
Chloride of Calcium
Bicarbonate of Soda

BLEACHING POWDER

Zinc Chloride (Liquid)
Magnesium Chloride
Sulphite and Hyposulphite of Soda

LIQUID CHLORINE

LONDON OFFICE - 9, MINCING LANE, E.C.3

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

BAILEY, Sidney George, Ivydene, Ramsden Bellhouse, chemical merchant. £73 5s. 2d. July 12.

BELENITE CHEMICAL CO., LTD., Sugar House Lane, Stratford, chemists. £14 10s. June 28; and £18 6s. 11d. July 5.

CINEMA SOAP CO., LTD., 22, Finsbury Park Road, London, soap makers. £13 19s. 10d. June 23.

CRANSTON, E., 314, Langley Road, Catford, chemist. £11 18s. 8d. July 6.

EDWARDS, J. M., 311, Fulham Palace Road, S.W., chemist. £14 12s. 7d. July 5.

FOSTER, J. R., 626, Holderness Road, Hull, chemist. £59 16s. July 3.

SHEARD AND WILSON, Wallgate Chemical Works, Wigan, chemical merchants. £10 14s. 4d. July 4.

STEVEN, Mrs. (trading as R. STEVEN), 19, Liverpoo Road, Stoke-on-Trent, chemists. £14 5s. 6d. June 22

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

COOPER (ARTHUR), LTD., Burton-on-Trent, paint manufacturers.—Registered August 5, mortgage to bank; charged on 5, Horninglow Street, Burton-on-Trent, with surgeries and other premises adjoining. *£1,000. April 21, 1922.

NEW BRITANNIC CHEMICAL CO., LTD., London, E.C.—Registered August 8, £5,000 debentures to J. E. Evans and another, Cardiff; general charge.

PARIPAN LTD., London, W., paint manufacturers.—Registered August 5, mortgage to bank.

POWELL (JAMES) AND SONS (WHITEFRIARS), LTD., London, E.C., glass manufacturers.—Satisfaction registered August 11, £55,000, registered October 27, 1920.

RADIUM ORE MINES, LTD., London, W.C.—Registered August 5, £470 debentures part of £10,000; general charge. *£2,818. December 31, 1921.

London Gazette

Bankruptcy Petition

LEVIN, Bertram, 16, Deansgate, Manchester, chemical manufacturer. Bankruptcy petition presented by Pilkington Brothers, Ltd., Tower Buildings, Water Street, Liverpool.

Partnerships Dissolved

NICHOL, Arthur, and WHITE, John, School Close Mills, Neville Street, Leeds, dealers in drugs and drysaltery, under the style of WHITE BROS. AND CO., by mutual consent on July 31. Debts received and paid by J. White, who continues the business.

SUMERFIELD, Frederick William, and SWIFT, Thomas, chemical merchants and drysalters, 22, Bridge Street, Manchester, under the style of SUMERFIELD AND SWIFT, by effluxion of time as from April 24, 1922.

Bankruptcy Information

DOUGLAS, Robert Steele Elliott, 62, Gibson Street, Newcastle-upon-Tyne, drug store proprietor. Receiving order, August 19. Debtor's petition.

Notice of Dividend

LEWIS, Thomas Henry, and ASHCROFT, Frank, trading under the style of LEWIS AND CO., 176, Moss Lane East, Manchester, and 5, Chapman Street, Hulme, Manchester, manufacturing chemists. Amount per £— 11s. 4¼d. First and final. Payable, August 30, Official Receiver's Offices, Byrom Street, Manchester.

Edinburgh Gazette

R. B. DICKSON AND CO., chemists, 745, Great Eastern Road, Parkhead, Glasgow (trading as ROBERT BROWN DICKSON). Meeting of creditors at the chambers of Thomas Smith and Sons, 135, Buchanan Street, Glasgow, on Tuesday, September 5, at 3 p.m.

OZO BRITE COMPANY, chemical manufacturers, 43, Wellington Street, Greenock (JAMES ROBERTSON AND MRS. CLARA ROBERTSON trading as). In this sequestration Robert Macfarlan, 149, West George Street, Glasgow, has been elected trustee of the estate; and James C. Barr, of James C. Barr, Ltd., chemical merchants, Glasgow; J. Hendry, of C. Tennant and Co., Ltd., 93, West George Street, Glasgow; and Alexander Ritchie Stewart, banker, Clydesdale Bank, Greenock, have been elected commissioners. The examination of the bankrupts will take place in the Sheriff Court, The Cross, Nelson Street, West Greenock, on Thursday, August 31, at 11 a.m. Creditors will meet in the chambers of Kerr, MacLeod and Macfarlan, 140, West George Street, Glasgow, on Tuesday, September 12, at 12 noon.

New Companies Registered

ARGENTUM POMARES, LTD., 115, Victoria Street, London, S.W. Agents for compositions known as "Argentum," etc. Nominal capital, £3,000 in £1 shares.

BRUCE (BATLEY), LTD.—Wheatcroft, Batley, Yorks. Manufacturers, importers and exporters of, and dealers in dyestuffs, chemicals, oils, soap, etc. Nominal capital, £500 in £1 shares.

CHANNEL FUEL CO., LTD., 52-4, Leadenhall Street, London, E.C. To acquire and deal in all substances capable of being used as fuel. Nominal capital, £1,000 in £1 shares.

GADONG COCONUT PLANTATIONS, LTD., 3, Princes Street, London, E.C. Cultivators of oleaginous seeds, vegetable oils and fats, etc. Nominal capital, £36,600 in £1 shares.

GENERAL CELLULOID CO., LTD., 190, Hanworth Road, Hounslow. Manufacturers of celluloid and allied materials, etc. Nominal capital, £4,000 in £1 shares.

SUPROFOAM, LTD. To acquire certain formulæ and secret processes, manufacturers of and dealers in cleansers, disinfectants, toilet and medicinal requisites, etc. Nominal capital, £2,250 in 4,000 10 per cent. cumulative preference shares of 10s. each, and 5,000 ordinary shares of 1s. each. A subscriber: F. Jordan, 106, High Street, Clapham, London, S.W.4

S. R. VAN DUZER AND SON, LTD., 114-116, Southampton Row, London, wholesale chemists and druggists. Nominal capital, £1,000 in £1 shares.

Motor Fuel from Molasses

DURING the past two years, states a Colonial Office report, several sugar firms in British Guiana have been investigating the possibilities of producing locally motor fuel from waste molasses. As a result of the experiments made, certain formulæ for the manufacture of alcohol motor fuel mixtures have been secured. It is claimed that these conclusively prove that a high-grade motor fuel can be manufactured in the Colony from sugar cane molasses. One of these firms is now preparing to manufacture power alcohol on a commercial scale, and the Government is assisting the enterprise by temporarily exempting the industry from taxation.